THE CONDOR

A Bi-monthly Magazine of Western Ornithology

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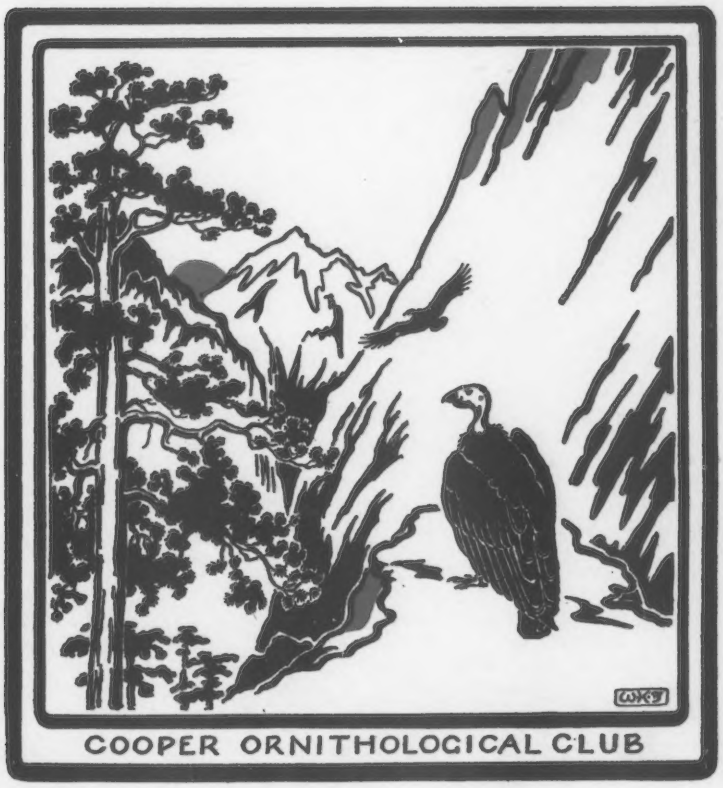

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Issued January 15, 1941

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Fig. 1. California Condor. Water color by Louis Agassiz Fuertes drawn from studies made in California in 1903. Reproduced through the courtesy of Mrs. Fuertes.

WILSON ORNITHOLOGICAL CLUB

THE CONDOR

VOLUME 43 JANUARY-FEBRUARY, 1941 NUMBER 1

THE ANNALS OF *GYMNOGYPS* TO 1900

By HARRY HARRIS

It has no doubt occurred to interested students as a remarkable and singular fact that not until the California Condor (*Gymnogyps californianus*) was on the very threshold of extinction has an adequately equipped and properly organized effort been made to secure a comprehensive body of data on its life history. It is true that sporadic and fragmentary contributions to this end have, throughout the years the bird has been known, resulted in an accumulation of much pertinent material, not all of which may be considered authentic, and also that the nesting behavior of a pair of the great vultures with their single young has been photographically recorded in highly satisfactory detail. However, among other things, no adequate photograph of feeding adults has ever been published; no eye witness has ever mentioned in print that condors disgorge pellets, or has attributed the motive for their morning exercise of testing the air for currents suitable to their need; nor has any observer ever described all the various color patterns of the head, or has given details of the bathing habits of these birds. At long last these matters and many others have been fully noted and most of them permanently preserved in color cinema film through the foresight and energy of Mr. J. R. Pemberton, a well-seasoned veteran of wide field experience, who otherwise has aided in taking the fullest advantage of what opportunity remains to secure a definitive life history of the doomed raptor.

The present writer has not escaped the general enthusiasm aroused by these and other current efforts on behalf of *Gymnogyps* and has been impelled thereby to review an unfinished bibliography of the species for the purpose of compiling a more or less continuous record of civilized man's relations with this bird. Such an account, like the complete life history of the bird itself, has never been brought together in one place, and in the hope that it may in some small measure assist in sustaining the interest already centered around the species, as well as in emphasizing the imminence of its total extirpation, the story is given here as it has been found reflected in the bibliography.

It should be stated at the outset that the ethnozoologic phase of the story, including a proper treatment of the cosmogonic significance of the bird to aboriginal man, is too involved and speculative a field for any but a trained and experienced specialist to deal with authoritatively, and it will, perforce, be but briefly adverted to.

Who, or on what voyage, may have been the first European to lay eyes on the giant vulture must forever remain unknown. The fragmentary documents that have come down to us from the sixteenth century explorers, known to have been first to enter the range of the species, contain no mention of a gigantic bird, though there is an early vague reference to griffins. The serious business of fighting scurvy and the constant fear of sudden death from shipwreck or at the hands of unknown savages precluded the notice of a mere vulture, even one of astounding size. However, it cannot be presumed that Drake, Cabrillo, Carmenho, and the others before 1600 failed entirely to see the bird.

The record begins with the published diary of a barefoot Carmelite friar, Fr. Antonio de la Ascension, who in 1602, from the tossing deck of a tiny Spanish ship, observed on

a California beach the stranded carcass of a huge whale (conceivably and probably) surrounded by a cloud of ravenous condors. Here indeed is material with which to stir the most dormant imagination; civilized man for the first time beholding the greatest volant bird recorded in human history, and not merely an isolated individual or two, but an immense swarm rending at their food, shuffling about in crowds for a place at the gorge, fighting and slapping with their great wings at their fellows, pushing, tugging at red meat, silently making a great commotion, and in the end stalking drunkenly to a distance with crop too heavy to carry aloft, leaving space for others of the circling throng to descend to the feast!

Such a scene has been recorded on a lesser scale in at least one section of the Pemberton film, which shows fourteen individuals devouring a coyote-killed sheep; the writer can vouch for the not entirely peaceful nature of the gathering. Two great old fellows had evidently selected the same spot for a landing and there had been a slight collision. They began immediately to box, dancing heavily and clumsily about, slapping at each other with upraised wings, the red of their wrinkled heads seemingly intensified in anger, and for the moment they were too engrossed in personal differences to have at the sheep, while the rest of the crowd with the utmost dispatch was filling up on mutton.

Fr. Ascension was acting as journalist, cosmographer, and spiritual advisor aboard the Santo Tomas, second of the three small ships in the fleet of Sebastian Vizcaino who had been ordered by the Viceroy of New Spain to explore the coast of the Californias. The fleet had left Acapulco May 5, 1602, and had entered the Puerto de Monterey on December 16, 1602. At this point in his account Fr. Ascension goes to some length in enumerating the animal life of the region, and states (see fig. 2): "There are some other birds of the shape of turkeys, the largest I saw on this voyage. From the point of one wing to that of the other it was found to measure seventeen spans." A few lines further on in speaking of the local occurrence of whales, he says: "One very large one recently dead had gone ashore on the coast in this port [Monterey Bay] and the bears came by night to dine on it." Thus was the stage set for the discovery of *Gymnogyps* by white men, with the opportunity at hand easily to secure a specimen for measuring. Ascension's natural history notes have in the main been found to be accurate, especially when recounting his own observations, and when he states that the wing spread was found to measure seventeen spans, it is permissible to visualize him spanning off a line between two marks in the sand (comfortably up wind from the whale), and noting this excessively large figure for entry in his journal. A span has always been reckoned as eight inches, thus making the friar's measured spread eleven feet four inches, which is concidered excessive for even an old bird. Unlike the later pioneers with whom fourteen feet seems to have been the favorite minimium, Ascension merely used too strong an arm in extending the wings or perhaps too small a span in measuring them.

The Ascension diary of this important voyage was not long in being made known to the world. Since its inclusion by the Franciscan scholar Torquemada in his monumental history, usually cited briefly as the "Monarchia Indiana" and published first at Seville in 1615, it has been reprinted innumerable times in many languages. One of the best known of these is Venegas', now known to be Burriel's, "Noticia de la California . . . Madrid, 1757," and the English translation, "A natural and civil history of California . . . London, 1759." Torquemada's first edition is especially important in the present connection as being the first printed book to mention the California Condor, but being one of the greatest rarities of early Americana it is almost impossible of access. One of the few copies known is owned by Pomona Colleges Library, Claremont, California, and it was from this copy that the photograph (fig. 3) of the title page shown here was made by the late Wright M. Pierce. The Huntington Library copy is of the second edition, Madrid, 1793, and is itself an excessively rare book.

A manuscript of 246 quarto pages now in the Ayer collection, Newberry Library, Chicago, titled "Relacion de la Jornada que hizo el general Sebastian Vizcaino al descubrimiente de las Californias el año de 1602. Por mandado del Exmo. Sor. Conde de

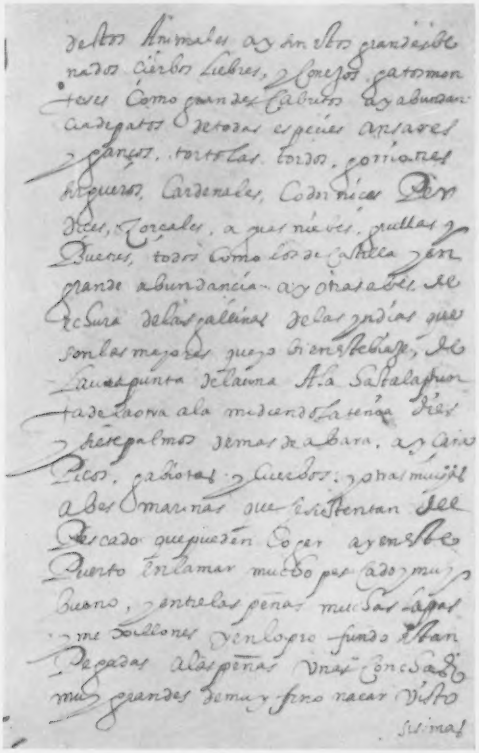


Fig. 2. Fr. Antonio de la Ascension's manuscript of 1602; first mention of the California Vulture; courtesy of Henry R. Wagner.

Monterey, Virrey que era de Nueva España," said to be in the hand of Fr. Antonio de la Ascension and signed by him, purports to be the original copy used by Torquemada. This manuscript has lately been translated by Mr. Henry R. Wagner and published in full in his "Spanish voyages to the northwest coast of America in the sixteenth century, San Francisco" (Calif. Hist. Soc. Special Publ. No. 4, 1929), where it is pointed out in a note that the bird referred to must have been the California Condor. However, Mr. Wagner's translation of the difficult old Spanish contains a small error in Ascension's measurement. A photostat of the page containing the reference in question was kindly loaned by Mr. Wagner for use here (fig. 2).

In the 167 years following Vizcaino's successful voyage, Spain made no further attempt to explore upper California, and not until 1769 were expeditions by both land

and sea sent north from New Spain with a view to colonizing favored regions, notably on San Diego and Monterey bays. It is likely that no white men were within the range of the species during this long interval, save possibly the Russians on the north, about which nothing certain has been traced, and the Jesuit missionary explorers in Lower California, whose numerous and scattered documents have yielded nothing larger than a Turkey Buzzard.

Fig. 3. Title page of Torquemada's "Monarchia Indiana," 1615; first printed book to mention the California Vulture; photograph by Wright M. Pierce; courtesy of the Pomona Colleges Library.

When the land force departed from its rendezvous on San Diego Bay in the summer of 1769, bent on the rediscovery of Monterey Bay, its route lay through an utterly unknown and unexplored country, every mile of it condor country. It would be strange if even these hard-bitten pioneers of the virgin wilderness had failed to remark the bird. Don Pedro Fages, second in command, Miguel Constanso, engineer, and Fray Juan

Crespi, missionary, have all recorded their familiarity with it, and Fages gave the first intimation of a strange Indian ceremony involving *Gymnogyps,* which many years later was to be published in detail from a manuscript by Fr. Geronimo Boscana of San Juan Capistrano Mission.

The details of these writings, from manuscript, through early publication, and down to recent translations by competent scholars, constitute matters of bibliographical interest only, and will not be entered into here nor in other instances beyond. Suffice it to record that Fages said: "Eagles are seen which measure fifteen spans from tip to tip, the shaft of their feathers being as large as the largest finger of the hand. The natives raise some eaglets in their villages, and succeed in domesticating these birds, but they do not eat them." Aside from the ten feet of wing spread as indicating only the condor, the reader will better understand why no other raptor is meant when the "Panes" ceremony is explained later on.

In camp at a point not far from the present city of Watsonville, on October 8, 1769, Constanso made this entry in his diary: "Here we saw a bird that the natives had killed and stuffed with grass; it appeared to be a royal eagle; it was eleven palms from tip to tip of its wings. On account of this find we called the river the Rio del Pajaro." In his diary under the same date Fr. Juan Crispi says: "We halted on the bank of the river which the explorers had discovered not far from the burned village, which was near the very verdant plain full of cottonwoods, alders, tall oaks, live oaks, and other species not known to us. We saw in this place a bird which the heathen had killed and stuffed with straw; to some of our party it looked like a royal eagle. It was measured from tip to tip of the wings and found to measure eleven spans. For this reason the soldiers called the stream Rio del Pajaro. . . ." This specimen of only a seven-foot four-inch wing spread was doubtless the juvenile being raised and fattened for the annual sacrifice by the natives of the burned village, and according to compiled nidification data, could have been anywhere from five to nine months of age, which would account for its comparatively small size. Every tribe fortunate enough to possess rights to a nest cave owned a pet young condor for the several months prior to its sacrifice, which was the most important festival in their calendar, and their prematurely doing away with this demigod under the circumstances recounted indicates some connection with their hope of personal safety and their belief in the immortality of *Gymnogyps* and his power to prevail over the death of his friends. It may be of interest to add that the stream referred to is still known as the Pajaro, vicariously perpetuating the name of a once characteristic bird of the region, but which long ago vanished from that area.

By the time the first precarious years had passed since the founding of missionary establishments along the coastal areas and when the earliest colonists had gained a foothold in Alta California, qualified observers began to appear on the scene to wonder at the strange animal forms they beheld. The Franciscans themselves, so successful in subduing the wilderness about their missions, had no interest in natural history, and unlike their Jesuit bretheren had nothing whatever to say regarding the birds of the air or the beasts of the field. They could have left us an important and voluminous record of facts, especially about the great vulture.

The first men of science to arrive were those accompanying the ill-fated Alejandro Malaspina, about whom much has been written and little is known. It is certain that his was one of the most elaborately equipped scientific expeditions ever to visit the west coast of America, and the one that logically may be presumed to have taken the first specimen of *Gymnogyps* for scientific purposes, as he had ample time during his stay in Monterey in 1791 to secure a representative collection of the entire biota of the region. However, owing to his too outspoken opposition to Spain's foreign policy, he was im-

prisoned on his return to Cádiz in 1794. The results of his voyage were suppressed, and the scientists, naturalists, collectors, artists, and other specialists comprising the carefully chosen corps of experts accompanying him were forbidden even to prepare their reports for publication. A review of the many accessible references to Malaspina's voyage leaves the impression that he was an able director of field naturalists, and that once they were loosed in an area there remained little to be discovered. It can only be assumed, however, that these picked collectors did not fail to secure specimens of the largest bird they could have seen on the voyage. A contemporaneous account of the known facts regarding this voyage, that seems to have been generally overlooked, is to be found in the "Introduction historique" to Charles Pierre Claret Fleurieu's "Voyage autour du monde, pendant les années 1790, 1791, et 1792" (Paris, 1798-1800).

The question of whether Malaspina did or did not take *Gymnogyps* acquires added interest when brought together with the less uncertain facts of another lost specimen antedating Menzies' type. The Spanish government of that time had most sound and valid reasons for adventuring vast outlays of wealth in efforts to secure trustworthy information on the natural resources of the whole of Pacific America. In accordance with ambitious plans to this end, Malaspina had been sent on a world cruise with two ships, and almost concurrently a scientific commission had been dispatched to New Spain instructed to make a botanical survey of the entire country. Among the botanists selected to compose this group was one Don Jose de Longinos Martinez, who it has been said was unable to agree with his fellows of the commission. Some time after their arrival in Mexico City in 1788 he struck out on his own biological and mineralogical survey of the Californias. Traversing the entire distance from the Cape region of Lower California to the San Francisco Bay district, this enthusiast collected much miscellaneous information and a number of specimens, including at least one California Condor. On his return by ship from Monterey to San Blas he mailed from a port on the coast of Lower California advices to a friend in Madrid that he was forwarding a shipment of specimens. The letter, dated San Borja, Old California, April 15, 1792, addressed to Professor Antonio Porlier, Madrid, Spain, was attached to a manifest containing an itemized list of fourteen species of birds. The first bird on the list (specimen No. 1) is given the strange name of *Vultur Harpyia* (variety: *Monstruosa*), which is without much question the first systematic name ever applied to *Gymnogyps californianus*; and that, above all things, a trinomial!

The Longinos Martinez manuscript account of his exploration of California has long been known to local students as an item of the Wagner collection in the Huntington library, but only recently has it been translated by Professor Leslie Byrd Simpson and published by the San Marino institution. However, the letter and manifest of shipment do not belong with the codex, but have been included as very pertinent material by the translator who himself discovered them in the Archivo General de Indias in Seville, Spain. The specimen of the condor is of course lost; at least no further mention of it has yet been uncovered, and it is presumed the name was never published. The evidence is explicit enough that this early specimen was taken in California sometime in 1791 or early 1792 and that it therefore antedates the type.

Only seven months after Longinos Martinez sent off a specimen of the new vulture to his old teacher in Madrid, Capt. George Vancouver sailed into San Francisco harbor with his famous "Discovery" to explore up and down the California coast for some months. An able and fully documented account of Archibald Menzies, botanist and collector with Vancouver, has already been chronicled in these pages (Grinnell, Condor, 34, 1932: 243-252), and nothing can be added to our late editor's presentation of the facts in 1932. It may be permitted to restate here merely that Menzies took a specimen of the California Condor at Monterey in December, 1792, that later became the type

of the species. The photographs of this historic relic shown here (fig. 4) were taken in 1934 by permission of the British Museum (Natural History) authorities, and were received from the Cooper Club's good friend Mr. Gregory Mathews. The specimen was in poor condition when received at the museum in 1795 or 1796, but it was repaired and mounted for public exhibition and was displayed for several years. A good part of the beak had to be restored with painted wax. Because the taxidermist had no model or description to work from, there resulted a most unsatisfactory and unnatural looking

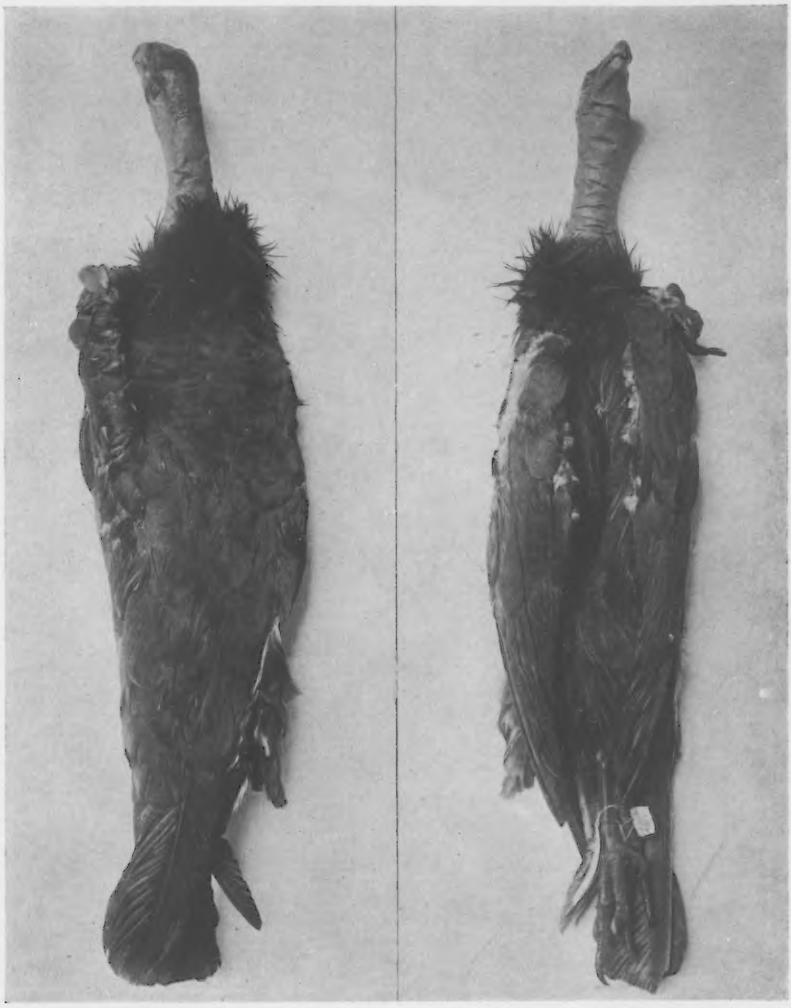


Fig. 4. Present condition of the type specimen of the California Condor; British Museum (Natural History) photograph.

artifact. Probably not until early in Sharpe's regime, when the value of even this poor specimen as the type of a very rare species was more fully appreciated, was it taken down from the mount and placed in the reference collection. Its present condition is a little worse than poor. As can be seen from the half-tone, it is a rusty and disreputable looking piece of museum property, but none the less a priceless type.

The species was formally introduced to ornithology by George Shaw, Keeper of the Zoological Department of the British Museum and a prolific contributor to all branches of zoological science. His chief vehicle for the descriptions of novelties between 1790 and his death in 1813 was an undated, unpaged serial, usually cited as "Shaw's Miscellany," containing hand colored copper engravings by some member of the Nodder family, a commercial house of engravers and publishers. Of the twenty-four volumes comprising a complete run of this periodical, only the first is titled or dated, the others containing merely the number of the volume. Some of the plates are dated, not always in accordance with the true date of publication, and this has given rise to confusion, discussion and dispute among generations of later systematists struggling to erect a stable and fixed nomenclature. Among those who have contributed authoritatively to the establishment of the dates of issue of the various parts are C. D. Sherborn, 1895 (Ann., Mag. Nat. Hist., ser. 6, 15, 1895: 375-376), J. A. Allen, 1912 (Bull. Amer. Mus. Nat. Hist., 31, 1912: 1-29), and W. H. Osgood, 1914 (Proc. Biol. Soc. Wash., 27, 1914: 1-4), but "Shaw and Nodder's Naturalist's Miscellany" continues to be a stumbling block.

While no nomenclatural snarl is involved in the date of publication of Shaw's description, it is a curious fact that the name *Vultur californianus* Shaw seems to have had a prior publication as a *nomen nudum*. Both Lichtenstein in 1838 and Lafresnaye in 1849 state that the name was first given by Latham in the second supplement of his "General Synopsis of Birds" and that the bird was afterward described by Shaw. Nodder's execrable portrait of the vulture is subscribed with the following legend in fine script: "London. Published Sep. 1, 1797 by F. P. Nodder & Co. No. 92 Newman Street, near Oxford Street." Whether it was issued as indicated or, what seems more likely, early in 1798 is immaterial. The second supplement to Latham's "General Synopsis of Birds" is dated variously 1801 and 1802, and both dates have been questioned by bibliographers for valid reasons. The copy examined by the writer very obviously had the title page, dated 1802, added after the text was printed, and Zimmer states that the Ayer copy date, 1801, is somewhat in doubt. The question can be settled only by tracing the actual date of publication of the Latham supplement II.

Shaw's description is notable for the fact that it fails to give anything like an adequate idea of what the bird looks like, as will be seen from the following transcript laid out in somewhat the form of the original:

THE
CALIFORNIAN VULTURE
****

Generic Character.

Bill strait, hooked at the tip.
Head commonly bare of feathers, with a naked skin in front.
Tongue bifid.

Specific Character.

Black VULTURE with whitish beak; the head and neck unfeathered and of a pale color; the plumes of the collar and breast lanceolate.
The feet are black: the claws large, long, and sharp.

The species of Vulture here represented is amongst the largest of the tribe, exceeding in magnitude the Vultur Percnopterus of Linnaeus, and even approaching in size to the Condor or Vultur

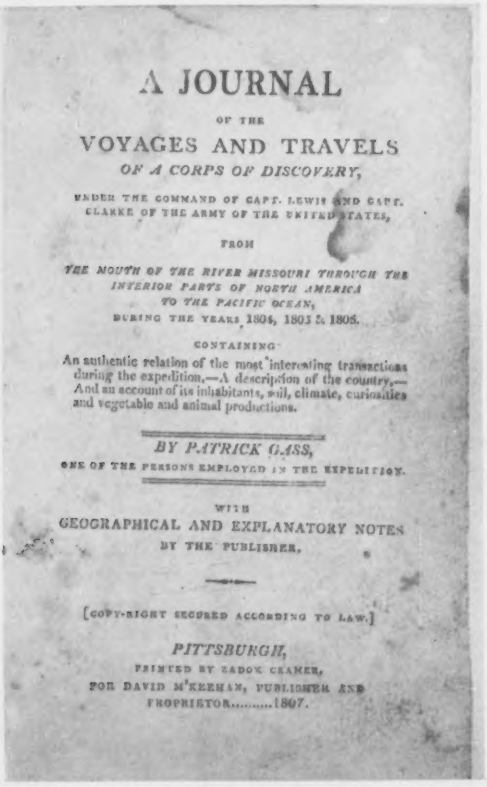
Gryphus. Its color is black, but the last or interior secondary remiges, which lap over the back, are whitish, especially on the interior edge: the covert-feathers of the wings are of a brownish tinge towards their edges. The head and neck are naked, or very sparingly sprinkled in some parts with a kind of setaceous down: the color of the neck is reddish, inclining to blueish on each side: the head is blackish at the top and back part, as well as round the beak, which extremely resembles that of the Condor in shape and color, and is rather obtuse at the extremity. The head is entirely void of any carunculated appearance: the lower part of the neck is surrounded by a ruff or wreath of black, lanceolate plumes, the fibres of which have a kind of setaceous or horny appearance. The feathers of the breast, abdomen, and thighs, are of the same structure in proportion to their size. The legs and feet resemble those of the Condor, but the claws are much sharper, longer, and of a more curved form.

The species of all others to which it seems to be most allied is the Vultur Monachus of Linnaeus: it has however no protuberance on the head, as in that bird, though the occiput is marked by a dark patch or zone, which seems indeed to rise a little above the surface of the other part. Perhaps it may be a sexual difference of that bird, notwithstanding the different form of bill, which in the V. Monachus is of a somewhat sharper form. The wings are long: the tail large, and of a squarish shape: the legs and claws are black. It may be added that the under surfaces of the shafts of the wing-feathers in this bird are of the same complexion with those of the Condor; viz. whitish, with numerous arrow-shaped transverse marks or bars.

Fig. 5. Nodder's plate in "Shaw's Miscellany"; plate dated 1797.

This Vulture was brought over by Mr. Menzies, during his expedition with Captain Vancouver, from the coast of California, and is now in the British Museum.

For something over a quarter of a century one of the chief objects of interest in the British Museum, to European ornithologists, continued to be the damaged specimen that had served as the basis for Shaw's not entirely satisfactory description and Nodder's necessarily misleading portrait. Many came over to London as opportunity offered to examine it, and a general interest in the species is reflected in the ornithological letters of that period, probably having its origin in the growing certainty that the American vultures did not belong with *Vultur*. The great desideratum in every European museum where there were active ornithologists was a fresh and undamaged specimen of the great vulture from California. There was no opportunity, however, to satisfy the general curiosity until sometime after 1827, when the Leiden Museum came into possession of what was described as an old male. The origin and history of this specimen is taken up beyond.



A JOURNAL

OF THE

VOYAGES AND TRAVELS

OF A CORPS OF DISCOVERY,

UNDER THE COMMAND OF CAPT. LEWIS AND CAPT. CLARKE OF THE ARMY OF THE UNITED STATES,

FROM

THE MOUTH OF THE RIVER MISSOURI THROUGH THE INTERIOR PARTS OF NORTH AMERICA TO THE PACIFIC OCEAN,

DURING THE YEARS 1804, 1805 & 1806.

CONTAINING

An authentic relation of the most interesting transactions during the expedition.—A description of the country,—And an account of its inhabitants, soil, climate, curiosities and vegetable and animal productions.

BY PATRICK GASS,

ONE OF THE PERSONS EMPLOYED IN THE EXPEDITION.

WITH

GEOGRAPHICAL AND EXPLANATORY NOTES

BY THE PUBLISHER.

[COPY-RIGHT SECURED ACCORDING TO LAW.]

PITTSBURGH,

PRINTED BY ZADOK CRAMER,

FOR DAVID M'KEEHAN, PUBLISHER AND PROPRIETOR.....1807.

Fig. 6. Title page of Patrick Gass' journal, 1807; first book printed in the United States to mention the California Vulture; Huntington Library photograph.

No American had brought back any concrete evidence that an unknown vulture of immense size existed on the Pacific coast up until the time when Lewis and Clark were sent out by President Jefferson to discover what lay beyond the headwaters of the great Purchase. As was the custom then, the government allowed its explorers, as part of their reward, the privilege of being first to realize on the public demand for their narrative. Lewis and Clark were in no hurry to accept this privilege. Instead, Patrick Gass, a sergeant in their command was permitted to publish the first authentic information on the epochal exploration and his book contains the first account of the California Condor published in the United States. The first edition, a small duodecimo of only 262 pages, printed in 1807, has long ago become a collector's item of stiff price and great rarity, as most copies were worn out by much handling. However, the book has been reprinted time and again, and the text is easy of access. The title page here reproduced (fig. 6) is from a copy of the first edition owned by the Huntington Library. The following notes have been culled from this issue:

Wednesday 20th [November, 1805, mouth of Columbia River]. They [Capt. Clark and party] killed a remarkably large buzzard, of a species different from any I had seen. It was 9 feet across the wings, and 3 feet 10 inches from the bill to the tail.

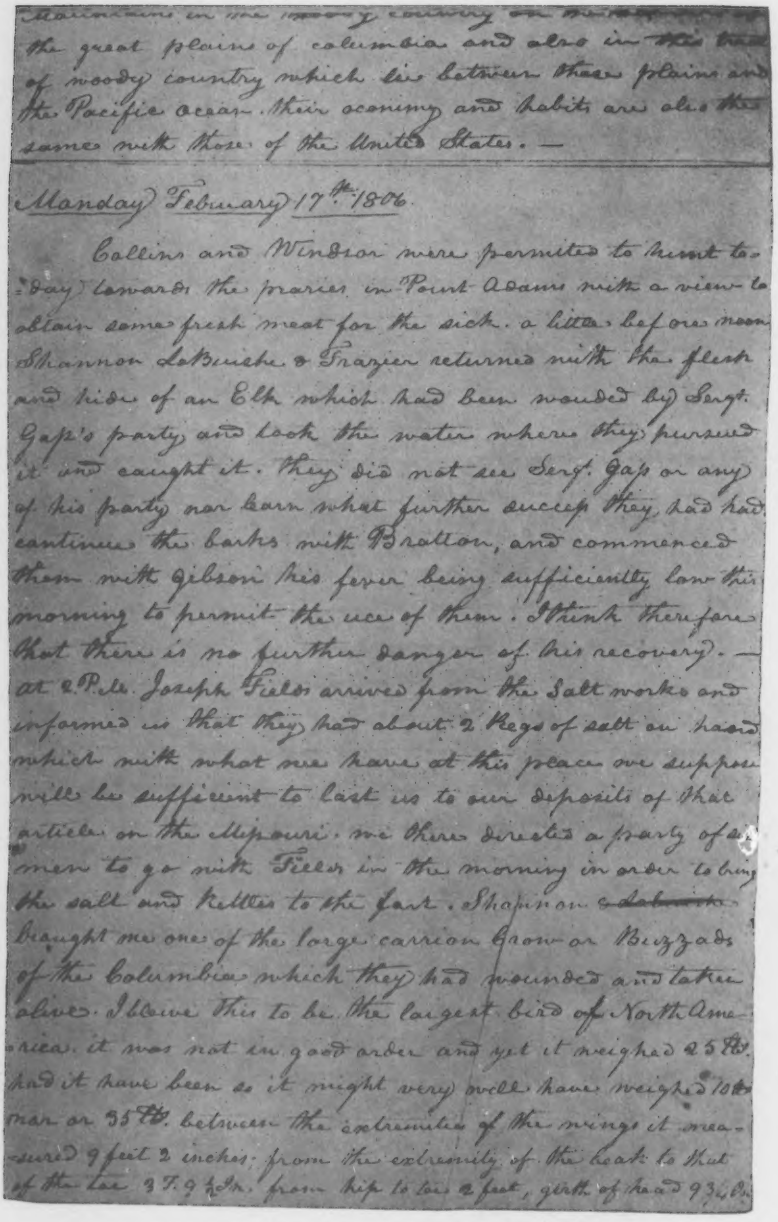
Sunday 16th [March, 1806, winter quarters about 30 miles from the mouth of the Columbia River]. Yesterday while I was absent, getting our meat home, one of the hunters killed two vultures, the largest fowls I have ever seen. I never saw such as these except on the Columbia River and the seacoast.

Friday 28th [March, 1806, Deer Island, Columbia River]. When our men went for the deer, they found that the fowls had devoured four of the carcasses entirely, except the bones.

With curiosity and interest whetted by Gass's lean account, an eager public was forced to wait until 1814 for the first published version of Lewis and Clark's own authorized story of adventure and discovery in the far west. The author was Nicholas Biddle of whose book Coues has said that it was faced, prefaced, and defaced by one Paul Allen. The public had in store a still longer wait for a more satisfactory version of "our national epic of exploration, conceived by Thomas Jefferson and wrought out by Lewis and Clark." The original journals as written down in the field were not published in full until 1904-1906.

It is fortunate for American vertebrate zoology that its most competent scholar, Dr. Elliott Coues, embraced to the full his opportunity to interpret directly from the original source material (codices, maps, and drawings) the great wealth of natural history notes and observations that the explorers themselves recorded on the spot in far distant and virgin fields. His findings are embodied in his own edition of the narrative published in four octavos in 1893 (Francis Harper); this edition is the first to make known much of the life history material gleaned from nature by the explorers, and the one among countless printings of the classic that is most coveted by zoologists. This edition enables the student to trace a given description to the original field note book of either or both of the leaders.

In order to lessen the chance of their loss, each captain copied from the other's diary important events or discoveries, and in the case of descriptions and drawings of natural objects it was Clark who copied from the better qualified Lewis. The pages containing the latter's description and profile drawing of the head of *Gymnogyps,* reproduced here (figs. 7, 8, 9) directly from his field note book (Codex J, pp. 79-81) by permission of the always generous American Philosophical Society of Philadelphia, may be read from the halftones. This detailed description, far more satisfactory than some to be found in works of pure ornithology, was made from a live bird, crippled and brought to camp by one of the hunters. Here for the first time the colors of the soft

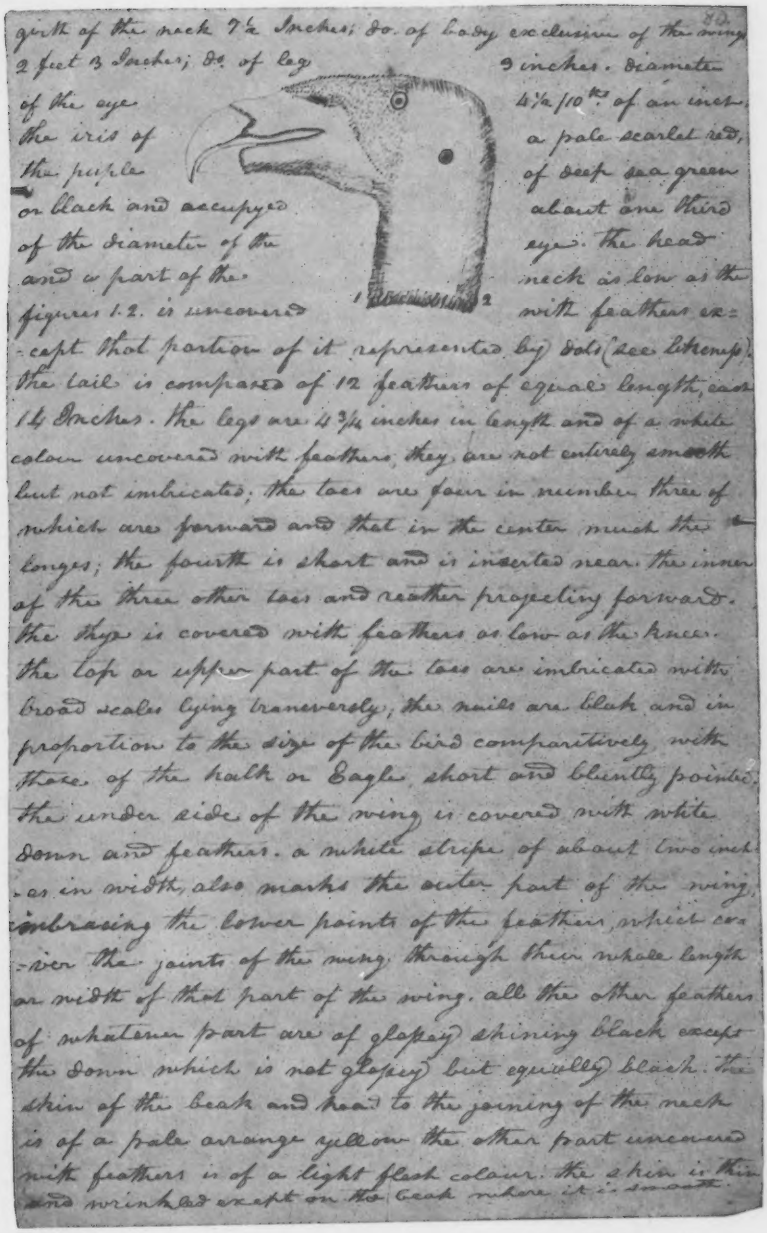


the great plains of columbia and also in this kind of woody country which lies between those plains and the Pacific ocean. their oconomy and habits are also the same with those of the United States. —

Monday February 17th 1806.

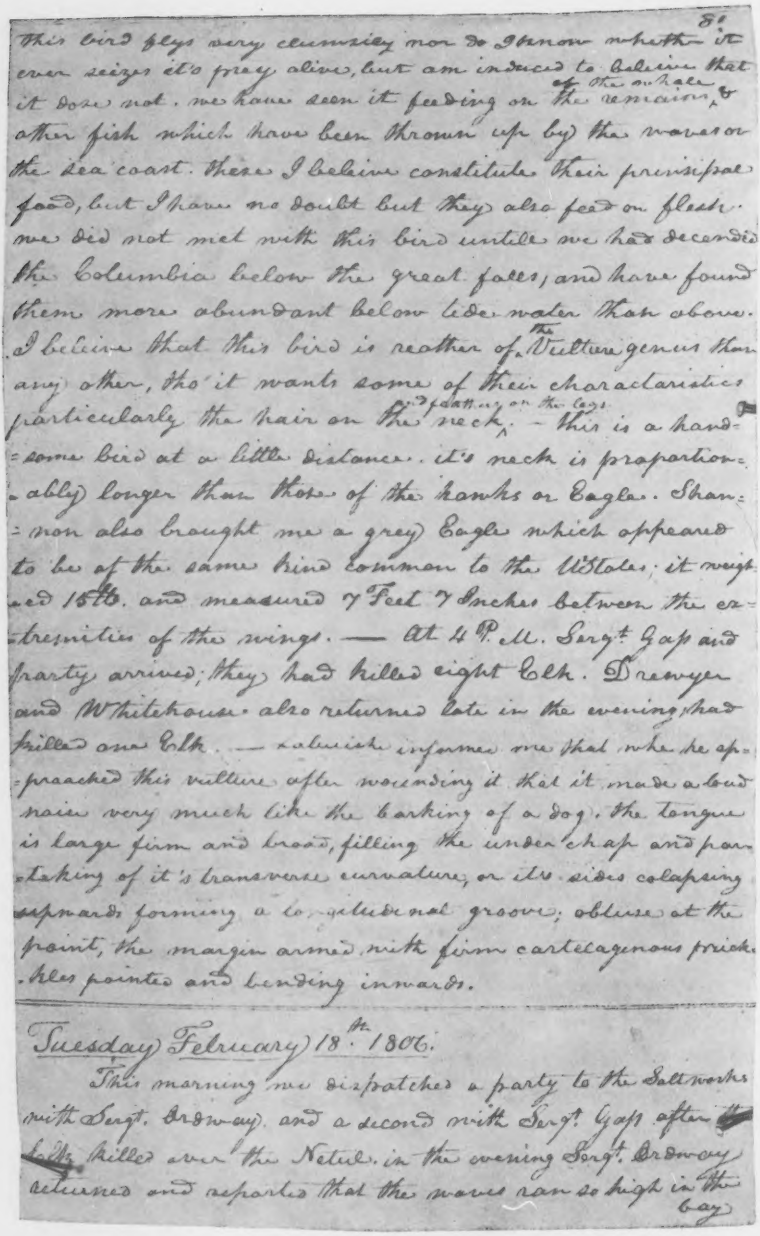
Collins and Windsor were permited to hunt to-day Leward the prairies in Point Adams with a view to obtain some fresh meat for the sick. a little before noon Shannon LeBuiche & Frazier returned with the flesh and hide of an Elk which had been wounded by Sergt. Gass's party and took the water where they pursued it and caught it. they did not see Sergt. Gass or any of his party nor learn what further success they had had. continued the barks with Bratton, and commenced them with Gibson his fever being sufficiently low this morning to permit the use of them. I think therefore that there is no further danger of his recovery. — at 2 P.M. Joseph Fields arrived from the Salt works and informed us that they had about 2 Kegs of salt on hand which with what we have at this place we suppose will be sufficient to last us to our deposits of that article on the Missouri. we there directed a party of six men to go with Fields in the morning in order to bring the salt and kettles to the fort. Shannon ~~Labuche~~ brought me one of the large carrion Crow or Buzzads of the Columbia which they had wounded and taken alive. I believe this to be the largest bird of North America. it was not in good order and yet it weighed 25 lb. had it have been so it might very well have weighed 10 lb more or 35 lb. between the extremities of the wings it measured 9 feet 2 inches: from the extremity of the beak to that of the tail 3 F. 9½ In. from hip to toe 2 feet, girth of head 9¾ In.

Fig. 7. Capt. Meriwether Lewis' manuscript, first page; Amer. Philos. Soc. photo.



girth of the neck 7¼ Inches; do. of body exclusive of the wing 2 feet 3 Inches; do. of leg 3 inches. diameter of the eye 4¼/10ths of an inch. the iris of a pale scarlet red, the pupple or black and occupyes about one third of the diameter of the eye. the head and a part of the neck is low as the figures 1.2. is uncovered with feathers ex= -cept that portion of it represented by dots (see Lithcut). the tail is compased of 12 feathers of equal length, each 14 Inches. the legs are 4 3/4 inches in length and of a white colour uncovered with feathers, they are not entirely smooth but not imbricated; the toes are four in number three of which are forward and that in the center much the longest; the fourth is short and is inserted near the inner of the three other toes and reather projecting forward. the thye is covered with feathers as low as the knees. the top or upper part of the toes are imbricated with broad scales lying transversely; the nails are black and in proportion to the size of the bird comparatively with those of the hawk or Eagle, short and bluntly pointed. the under side of the wing is covered with white down and feathers. a white stripe of about two inch= -es in width, also marks the outer part of the wing, imbraceing the lower points of the feathers which co= -ver the joints of the wing through their whole length or width of that part of the wing. all the other feathers of whatever part are of glossey shining black except the down which is not glossey but equally black. the skin of the beak and head to the joining of the neck is of a pale orange yellow the other part uncovered with feathers is of a light flesh colour. the skin is thin and wrinkled except on the beak where it is smooth.

Fig. 8. Capt. Meriwether Lewis' manuscript, second page; Amer. Philos. Soc. photo.



This bird flys very clumsily nor do I know whether it ever seizes it's prey alive, but am induced to believe that it does not. we have seen it feeding on the carrion of the whale & other fish which have been thrown up by the waves on the sea coast. these I believe constitute their prinsipal food, but I have no doubt but they also feed on flesh. we did not met with this bird until we had decended the Columbia below the great falls, and have found them more abundant below tide water than above. I believe that this bird is neather of the Vulture genus than any other, tho' it wants some of their characteristics particularly the hair on the neck & head & feathers on the legs. this is a handsome bird at a little distance. it's neck is proportionably longer than those of the hawks or Eagles. Shannon also brought me a grey Eagle which appeared to be of the same kind common to the U States; it weighed 18lb. and measured 7 Feet 7 Inches between the extremities of the wings. — At 4 P. M. Serg.t Gass and party arrived; they had killed eight Elk. Drewyer and Whitehouse also returned late in the evening that killed one Elk. — Labiesh informs me that whe he approached this vulture after descending it that it made a loud noise very much like the barking of a dog. the tongue is large firm and broad, filling the under chap and partaking of it's transverse curvature, or it's sides colapsing upwards forming a longitudinal groove, obtuse at the point, the margin armed with firm cartelagenous prickles pointed and bending inwards.

Tuesday February 18th 1806.

This morning we dispatches a party to the Saltworks with Serg.t Ordway, and a second with Serg.t Gass after Elk killed over the Netul. in the evening Serg.t Ordway returned and reported that the waves ran so high in the bay

Fig. 9. Capt. Meriwether Lewis' manuscript, third page; Amer. Philos. Soc. photo.

parts were written down from living nature; in fact here is the first known description of a live California Condor.

Other mention of the bird by both the explorers, taken partly from Coues' notes are:

October 30, 1805 [mouth of Wind River]. We here saw several of the large buzzards, which are of the size of the largest eagle, with the under parts of their wings white. (Lewis).

November 18, 1805 [Chinook River]. Rubin Fields Killed a Buzzard of the large Kind near the whale we Saw. measured from the tips of the wings across 9½ feet, from the point of the Bill to the end of the tale 3 feet 10¼ inches, middle toe 5½ inches, toe nale 1 inch & 3½ lines, wing feather 2½ feet long & 1 inch 5 lines diameter, tale feathers 14½ inches, and the *head* is 6½ inches including the beak. (Clark).

November 30, 1805 [Columbia River near its mouth]. Besides these wild-foul, there is in this neighborhood a large kind of buzzard with white wings. (Clark).

January 2, 1806 [Fort Clatsop, winter quarters on the Netul, or Lewis and Clark River]. There is also . . . the beautiful buzzard of the Columbia. (Lewis).

[January 20, 1806.] The buzzard is, we believe, the largest bird of North America. One which was taken by our hunters was not in good condition, yet its weight was 25 pounds. (Lewis).

March 28, 1806 [Deer Island, Columbia River]. Such is the extreme voracity of the vultures, that they have devoured in the space of a few hours four of the deer killed this morning; and one of our men [Fields] declared that they had besides dragged a large buck about 30 yards, skinned it and broken the backbone.

For over twenty years after Captain Lewis recorded the true characters of *Gymnogyps* European ornithologists remained in the dark as to many of the particulars and continued divided as to the position the new species should occupy in the then (as now) unstable systematic arrangement. One of the chief points at issue was whether the bird was carunculated or not. The describer denied the presence of carunculations, and this was reluctantly accepted by Vigors in his lengthy review of the Vulturidae in 1825 (Zool. Journ., 2: 368-384), although he pointed out that Shaw's specimen was deficient in the structure supporting these appendages to the head. As indicating the difference of opinion existing generally as to where the species belonged, Dumeril had as early as 1806 placed it in his new genus *Sarcorhamphus*; in the same year Turton retained it in *Vultur*, as did Latham, Vigors, and other English ornithologists up to 1825, and Lesson and other continentals as late as 1831; in 1811 Illiger set up *Cathartes* in which he later placed *californianus*. Other name usages followed: 1819, Vieillot, *Vultur californianus*; 1820, Temminck, *Cathartes Californianus*; 1823, Ranzani, *Cathartes californianus*; 1823, Vieillot, *Gypagus Californianus*; 1824, Temminck, *Cathartes vulturinus*; 1826, Bonaparte, *Cathartes californianus*; 1826, Stephens, *Sarcoramphus Californianus*; 1828, Lesson, *Cathartes vulturinus*; 1829, Griffith, *Cathartes californianus*; 1831, Swainson, *Sarcoramphus Californianus*; 1835, Baker, *Sarcoramphus californianus*; 1836, Kaup, *Cathartes californianus*; 1837, Swainson, *Cathartes Californianus*; 1838, Bonaparte, *Cathartes Californianus*; 1838, Lichtenstein, *Sarcoramphus californianus*. Finally, down through a lengthy synonymy, we come to Sharpe's *Oenops* of 1874 and Ridgway's *Pseudogryphus* of the same year, with Lesson's *Gymnogyps* of 1842 entirely overlooked until its revival by Richmond in 1901.

For a much longer period than the foreigners had to await the arrival of fresh material from the field after Vancouver's return, American students were forced to content themselves with what was published abroad and with the vague and unsatisfactory references in a few accounts of early western explorers and travelers, many of which did not see the light until a later period (Thompson's important journal, 1814, and the Alex. Henry MS, 1823-1824, to mention only two). They did have access to a skull and a primary wing feather deposited in Peale's Museum by Lewis and Clark, and they were almost unanimously in agreement with Bonaparte who compared these relics with a pair of Andean Condors confined in the Philadelphia Zoo and referred them with char-

acteristic emphasis to this species. Ord's dissent is reflected in his name *Vultur Columbianus* which he published in the second edition of "Guthrie's Geography" in 1815 (2: 315). So firmly fixed was this error in Bonaparte's mind that even after he had handled a specimen of *Gymnogyps* from the Columbia in 1827, and after Douglas in 1829 had published his account of taking the species on the Columbia, he clung to the delusion until at least 1833 when he included the South American species in the fourth volume of his continuation of Wilson's "American Ornithology." Nuttall also had been misled in the matter, and voiced his first suspicion of an error in identifying the Lewis and Clark fragments, as late as 1832, when he stated in the first edition of his "Manual" that it was by no means certain that the explorers had not met with the Californian Vulture instead of the Andean species.

In the course of a "momentary stay" in London in late 1826 or early 1827 Bonaparte discovered in the dealer Leadbeater's stock a specimen of the California Condor "from the Oregon, the second known in any collection" (Zool. Journ., 1827). The fact that Scouler had returned from the Pacific northwest (Columbia River) but a short time previous to this, together with the fact that the Leiden Museum specimen was often referred to in print later (by Temminck, Lichtenstein, Lafresnaye, and others) as being the second to reach Europe, would readily enough establish the source and final destination of the bird Bonaparte had "nibbled" at in London, were it not for the fact that Schlegel in 1862 listed this specimen as "1 adulte, Californie."

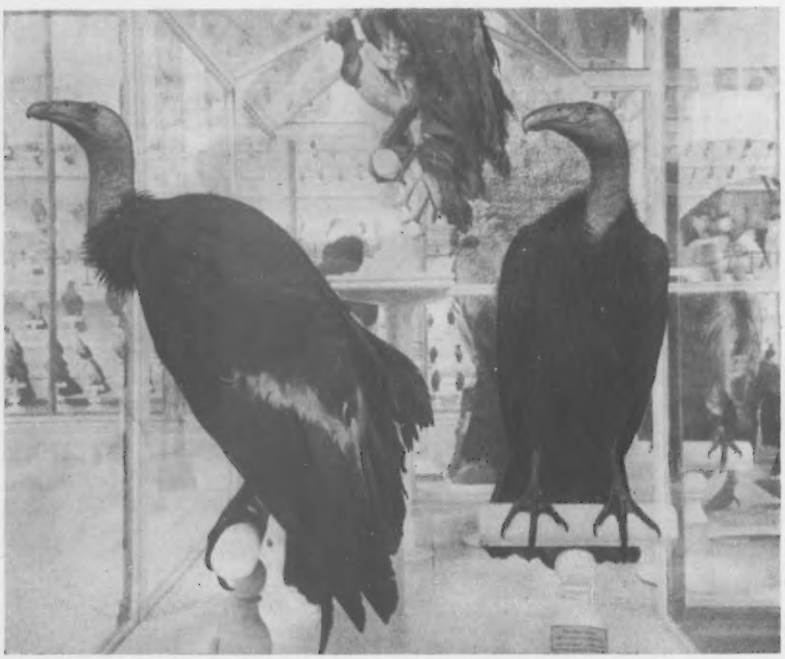


Fig. 10. Bonaparte's specimens in the Paris Museum; photograph by A. J. van Rossem.

The supposition that Bonaparte nibbled at and perhaps dickered for this high priced skin is entirely the compiler's, suggested by the fact that Bonaparte later acquired two specimens for his own collection. These passed finally into the possession of the Paris Museum where they still stand mounted in a large glass exhibition case.

When in Europe in 1933 Mr. A. J. van Rossem was kind enough to look up some *Gymnogyps* matters then greatly perplexing the present writer, and wrote from Paris on July 25, 1933: "The only condor relics to date (there is nothing at Rouen) are three birds here at the Musée d'Histoire Naturelle. All three are mounted and in good condition. Two adults are from the Bonaparte collection—marked simply 'Californie, acheté par l'Etate en 1858.' The third is more interesting,—it is in a plumage new to me, adult as to body and wings, but the head and neck are covered with a thin, buff-colored down, through which the yellowish skin shows plainly. It is marked as 'Acquis par exchange du Musée St. Petersbourg en 1856.' There is no indication as to the source of the Bonaparte pair of adults, but the St. Petersburg specimen *possibly* was taken by Pallas. I infer this by the fact that there are several other birds here which were received in exchange the same year from the same source. They are all by Pallas from 'Nord-Oest Côte d'Amerique.'" A little later from Berlin Mr. van Rossem wrote: "Stresemann thinks it very probable that the St. Petersburg specimen was taken by Bischoff's party." The compiler has thus far been unable to trace any reference in the literature to an opportunity offered either of these collectors to secure *Gymnogyps* in the field. It may be pointed out in this connection that Rezanov, with his personal physician Langsdorff (a naturalist), visited California in 1806, and that Kotzebue, with Chamisso and Eschscholtz, made two voyages to this coast between 1816 and 1824. None of the narratives of these voyages mentions the large vulture, although other natural history notes are included.

Mr. van Rossem was also kind enough to photograph the title pages and some textual matter from rare books inaccessible to the compiler, and at no little trouble to himself photographed the Paris and Berlin specimens shown here (figs. 10, 14). Dr. Stresemann kindly allowed the latter to be taken out in the park in a foggy mist for a better light. This historic specimen is the only skin of *Gymnogyps* ever received at the Berlin Museum.

Dr. John Scouler, a Scotch botanist who went to America with David Douglas, and who collected extensively on the Pacific northwest coast, entered in his journal under date of 20 September, 1825:

Today I took my leave of Fort Vancouver. . . . On arriving on board the ship much of my time was employed in procuring and preserving birds. The incessant rains we experienced at the advanced period of the year rendered the accumulation of plants hopeless. The river at this season was beginning to abound in birds. I obtained specimens of *Pelecanus onocrotalus, Falco*—& a species of *Vultur*, which I think is nondescript. My birds are princip[al]ly obtained from the Indians who would go through any fatigue for a bit of tobac[c]o. (Sources for Scouler many; chiefly his own version of journal in Edinburgh Journal Science, 1826-1827, and journal in full in Quart. Oregon Hist. Soc., 1905.)

David Douglas, who did not live to return to England, included with his immense collection of plants dispatched to London sometime in 1828, possibly late in 1827, two specimens of the California Condor taken on the Columbia River, which were the third and fourth, respectively, to be received in Europe. They were sent to the Horticultural Society of London, the council of which body presented them to the Zoological Society of London. What was perhaps of equal if not of even greater importance was his "Observations on the Vultur Californianus of Shaw" sent at the same time to Vigors' "Zoological Journal" and published in the October, 1828, and January, 1829, issues. Here is the first account of the life history, habits, and behavior of the bird to appear in print—twenty-two years after our own explorer's authentic notes had been consigned to the archives. Douglas' authority was of course unimpeachable and his own observations were in accord with his high attainments and reputation as a man of science, but he most unfortunately included in the article some fantastic and highly imaginary misinformation regarding the nidification of the vulture imparted to him by a waggish Canadian voyageur. This is of course the feature of the article that has lived, and the fiction of the two spherical jet black eggs in a nest of large sticks lined with grass, and all the rest, has been reprinted an untold number of times, and strange to say is still

being reprinted. Some of the entries in the Douglas diary that contributed to the article are as follows:

[January to March, 1826.] A species of Buzzard or Vulture (*Sarcoramphos Californianus* of Vigors) is the largest bird seen here [mouth of Columbia River], except the Wild Swan. I killed one of these interesting birds, but the buckshot which went through its head spoiled the specimen for preservation, which I exceedingly regret, as I am sure the species is yet undescribed. I have since fired at many of them with every kind of smaller shot, but without effect. Seldom more than one or two of these Buzzards are seen together; but when they can find the carcass of any dead animal, they gorge so gluttonously that it is easy to knock them down with a stick. I shall shortly try to take them with a baited steel trap. The color of the species is similar to the Canadian Buzzard which I sent home, the beak and legs bright yellow. Its wing feathers are highly prized by the Canadian voyageurs for making the stems of their tobacco pipes.

10th to 15th October [1826, on a journey south to California border]. Many birds . . . and *Sarcorhamphos californica* . . . were collected.

Thurs. Feb. 1st to Wed. Feb. 28th [1827, Fort Vancouver, Columbia River]. Killed a very large vulture, sex unknown. Obtained the following information concerning this curious bird from Etienne Lucien [the wag], one of the hunters who has had ample opportunity of observing them. They build their nests in the thickest part of the forest, invariably choosing the most secret and impenetrable situations and build on the pine tree a nest of dead sticks and grass; have only two young at a time; egg very large (fully larger than a goose-egg), nearly a perfect circle and of a uniform jet black. The period of incubation is not exactly known; most likely the same as the eagle. They have young in pairs. During the summer are seen in great numbers in the woody parts of the Columbia, from the ocean to the mountains of Lewis and Clark's River, four hundred miles in the interior. In winter they are less abundant; I think they migrate to the south, as great numbers were seen by myself on the Umpqua river, and south of it by Mr. McLeod, whom I accompanied. Feeds on all putrid animal matter and are so ravenous that they will eat until they are unable to fly. Are very shy; can rarely get near enough to kill them with buck shot, readily taken with a steel trap. Their flight is swift but steady, to appearance seldom moving the wings; keep floating along with the points of the wings curved upwards. Of a blackish-brown with a little white under the wing; head of a deep orange colour; beak of a sulphur-yellow; neck a yellowish-brown varying in tinge like the common turkey-cock. I have never heard them call except when fighting about food, when they jump trailing their wings on the ground, crying Crup-Cra-a, something like a common crow. (Douglas sources are mostly botanical, but full journal in Quart. Oregon Hist. Soc., 1904-1905, and his own version in Companion of the Botanical Journ., 1836.)

J. H. Fleming called attention (Condor, 26, 1924: 111-112) to George Barnston's biographical sketch of David Douglas (Canadian Naturalist and Geologist, 1860) containing the following interesting account:

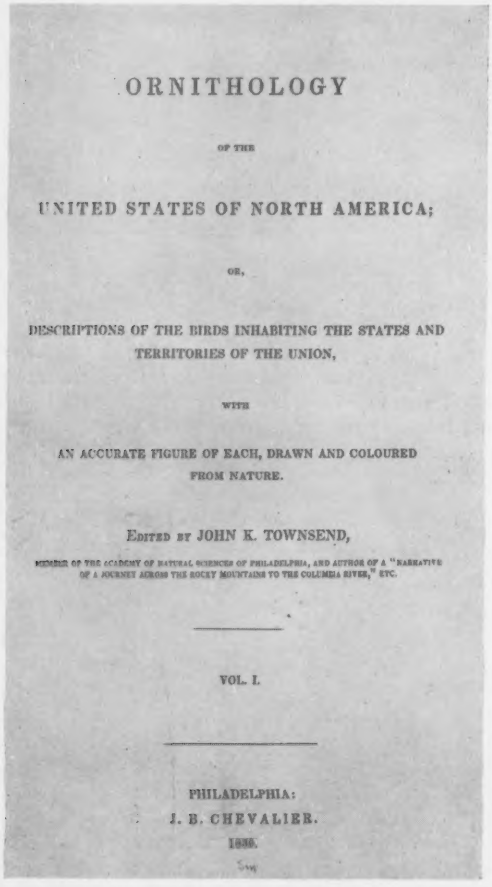
The spring of 1827 was severe, and much snow had fallen. The consequence was that many horses died in Fort Vancouver, and we were visited by the various species of beasts and birds of prey that abound in that country. Most conspicuous among these were the California vulture. This magnate of the air was ever hovering around, wheeling in successive circles for a time, then changing the wing as if wishing to describe the figure 8; the end of the pinions, when near enough to be seen, having a bend waving upwards, all his movements, whether soaring or floating, ascending or descending, were lines of beauty. In flight he is the most majestic bird I have ever seen. One morning a large specimen was brought into our square, and we all had a hearty laugh at the eagerness with which the Botanist pounced upon it. In a very short time he had it almost in his embraces fathoming its stretch of wings, which not being able to compass, a measure was brought, and he found it full nine feet from tip to tip. This satisfied him, and the bird was carefully transferred to his studio for the purpose of being stuffed. In all that pertained to nature or science he was a perfect enthusiast. It has frequently been a matter of surprise how quickly these birds collect when a large animal dies. None may be seen in any direction, but in a few minutes after a horse or other large animal gives up the ghost they may be descried like specks in the æther, nearing by circles to their prey, when as yet one would not suppose the effluvia from the carcase had reached above a hundred yards. This renders it probable that their sight as well as sense of smelling is very acute, but that the latter can guide them entirely without aid from the other, as I am certain, as I have started them from carrion within the edge of the forest under bushes which must have precluded the possibility of their seeing the carcase before they alighted on it.

At the time of Douglas and Scouler's visit to the Columbia, Ross Cox, an employee of the Pacific Fur Company, was somewhere in the general region, having arrived in 1811 with the second ship sent out by J. J. Astor. At one time in charge of a fur trading post, he had adventured over the west from the Rockies to the Pacific, and in 1832 he published an account of his wanderings and adventures (J. & J. Harper). This book is mentioned here as the possible source of an often printed statement that the range of the California Condor at one time was known to extend to the Fraser River in British Columbia. Cox merely mentions *vultures* in New Caledonia on the banks of Fraser's River, "about lat. 53 N.—long. about 124 W.," which is well up the river, being as far north of the present international boundary line as the Columbia River is south. It is of course entirely possible that the species did range this far north after the advent of white men in the northwest, and no less likely that the St. Petersburg specimen referred to above, even though a juvenile, may have been taken on the coast even farther north. Any printed statement by an eye witness, more explicit than Cox's has escaped this compiler. The journal of Simon Fraser, who discovered the river on his exploration of 1806-1808, contains natural history matter denoting his possession of a keen eye for all natural objects, but he has nothing to say of vultures on his stream.

In the fall of 1834, Dr. John Kirk Townsend and Thomas Nuttall ended their historic overland journey with Wyeth's Oregon Expedition and arrived on the Columbia River. Their presence there may be taken as reflecting an impatience of long standing among American students to gain a first hand knowledge of the biota of this, to them, unknown field, and to secure representative material for eastern cabinets. Townsend was the first man of science with an interest and purpose solely ornithological to reach this uttermost limit of the American wilderness, his purpose being to introduce to science the new forms that would for that period complete the North American avifaunal list—an entirely legitimate ambition that he was to realize only vicariously. The details of their journey and the results of their labors in the field are matters of permanent, though scattered record in the literature, and need no repeating. Laden with the spoils of his own botanical collecting, and with Townsend's new birds, Nuttall was first to return to civilization, precipitating Audubon's classic stampede. It is not known how many specimens of the big vulture Townsend secured, as it is nowhere stated in his own publications, nor has it been found mentioned in print elsewhere. At all events he brought back a fresh eye witness account of the bird, which he generously allowed Audubon to use, and a specimen in juvenal plumage which Audubon was first to describe in print; he intimated between the lines of a published letter that he was not entirely satisfied with his vulture experience in the far west. His disappointment in this particular was obviously the result of the bird's actual scarcity, as there is no valid evidence that it was ever an abundant species on the Columbia. It was evidently already beginning to frequent this northern extremity of its range in still fewer numbers. As a further token of its scarcity at that time, Townsend had met on the river a Reverend Samuel Parker, a man of some ornithological parts with whom he had discussed at length the birds of the region, who during an extended stay failed to see the vulture. There is no reason to take the vulture notes found in the diaries and narratives of De Smet, Farnham, Simpson, Ware, and several other travelers on the Columbia during the early and middle forties, as referring to any bird but *Cathartes aura*, as the larger vulture is not specified and it seems to have disappeared from the river by this time.

The year following his return to Philadelphia, Townsend opened the first part-issue of his long contemplated work on the "Birds of the United States" with a lithographed plate of the California Vulture accompanying his description and observations, which

are brief and add little to Douglas' account. He suppressed this work in favor of Audubon's announced octavo edition, and this first fascicle, which was never distributed, has always been one of the greatest rarities in the immense field of American ornithologica.



ORNITHOLOGY

OF THE

UNITED STATES OF NORTH AMERICA;

OR,

DESCRIPTIONS OF THE BIRDS INHABITING THE STATES AND TERRITORIES OF THE UNION,

WITH

AN ACCURATE FIGURE OF EACH, DRAWN AND COLOURED FROM NATURE.

EDITED BY JOHN K. TOWNSEND,

MEMBER OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, AND AUTHOR OF A "NARRATIVE OF A JOURNEY ACROSS THE ROCKY MOUNTAINS TO THE COLUMBIA RIVER," ETC.

VOL. I.

PHILADELPHIA:
J. B. CHEVALIER.
1839.

Fig. 11. Title page of Townsend's suppressed work; Museum of Comparative Zoology photograph.

The photostats (figs. 11, 12) were kindly furnished by the library of the Museum of Comparative Zoology, and were made from one of the five or six copies known to have survived. A Townsend paper titled "Popular monograph of the accipitrine birds of North America, No. I [-II]," (Lit. Rec. and Journ. Linn. Assoc. Penna. College, 4, 1848: 249-255; 265-272) is said to contain an extended general account of *Gymnogyps*, but has not been accessible for reference here.

While Townsend was still somewhere on the Pacific coast, Ferdinand Deppe, a figure mentioned several times in California history near the end of the Spanish period, made the last of many trips from points on the west coast of Mexico to the various ports of California (David Douglas says in his journal under date of October 24, 1832, "I heard of M. Klotzsch from Mr. Ferdinand Deppe, of Berlin, whom I had the pleasure to meet in California. Formerly M. Deppe devoted his time wholly to Natural History, Zoology in particular: but now he is partly engaged in mercantile pursuits. . . ." It may be added

Fig. 12. Plate in Townsend's suppressed "Ornithology of the United States of America," 1839: Museum of Comparative Zoology photograph.

that Townsend also met Deppe, later in Hawaii.) On his last trip, Deppe traversed the arduous overland route up the peninsula as far as San Diego over the same trail Longinos Martinez traveled nearly fifty years before. Like his Spanish predecessor he secured a specimen of the California Condor. Deppe was well known in European scientific circles as an experienced collector of zoological and botanical material, chiefly in Mexico, and for years had corresponded regularly with the Berlin Museum, where all his birds were deposited and where duplicates were disposed of in his interest (see Lichtenstein's famous "Preis-Verzeichniss der Saugethiere, Vögel, Amphibien, Fische und Krebse, welche von der Herren Deppe and Schiede in Mexico gesammelt worden, Berlin, 1830, of which no known copy of the original exists). It is inferred that this final journey was undertaken chiefly for the purpose of filling in some notable gaps in the Berlin collections, and it goes without saying that one of its prime objects was to take at least one specimen of the much desired Californian Vulture.

On receipt of the specimen in Berlin (the fifth in Europe), Lichtenstein, then director of the museum, had it mounted in accordance with the most approved German standards. Happy in the possession of material with which at last to show an adequate likeness of the rare species, he had an engraved portrait prepared to accompany his report. What success he achieved in this particular may be judged by comparing this plate (fig. 13) with Nodder's and with Temminck's, the only two yet published; it

Fig. 13. Lichtenstein's plate, dated 1838; Huntington Library photograph.

would be unfair to judge it by later standards, since Audubon's superb plate was published but a short time afterward. Lichtenstein's report, "Beitrag zur ornithologischen Fauna Californien nebst Bemerkungen über die Artkennzeichen der Pelicane und über einige Vögel von den Sandwich-Inseln," has never been translated in print, and chiefly because it is an important California item, that part of it dealing with the vulture is given here in full. As an indication of its rarity it is believed that Pacific coast libraries contain a total of not more than four copies, which may account for the late discovery that the report exists in two quite different versions published three years apart. The curious bibliographical question involved has been ably discussed and answered by Dr. G. D. Hanna, of the California Academy of Sciences, in the Condor for 1931 (pp. 211-213). The following translation has been made from the variant of the paper taken from the whole volume (dated 1840) indicated by Hanna as the second issue:

1. Vultur californianus Shaw.

The first specimen of this species of vulture came to Europe thirty years ago and was presented stuffed to the British Museum, but it had been handled so awkwardly that the most important parts, like the head and beak, can not be recognized in their true form, as they were restored with wax. After Latham mentions it in the second Supplement of the *Synopsis*, Shaw gives a description and reproduction in his *Naturalist's Miscellany* tenth [sic] part, which, however, shows all the defects of the original. Nevertheless Herr Temminck in 1822 had a reproduction of it made in this condition in his continuation of Buffon's work (*Planches coloriées d'Oiseaux*) and excused the very evident defects of this presentation with the uncommon rarity of the object. Its true form and peculiarity has therefore been unknown until the present time and a new reproduction will probably be much desired by many ornithologists. I append one hereto. (Plate I.)

After the division by Illiger of the vultures into the genera *Vultur* and *Cathartes*, Herr Temminck could not use the previously accepted nomenclature of Shaw because the characteristics of the true vulture only agree with those of the largest species of Asia and Africa. Meanwhile, however, he believed he had found some approach to these in the California vulture and named it *Cathartes vulturinus*. A note (after the Appendix to the article Condor Pl. 408) which has just become known in the last delivery of the *Planches Coloriées* 1836, informs us that the Netherlands Museum has received a specimen of this bird from California and points out more plainly the close relationship between it and the condor of the Andes chain, without however mentioning the defects of the former descriptions (namely the beak). Moreover, Herr Temminck only admits as distinguishing characteristics of the California vulture the lack of fleshy comb and of the white tracing in the pinion feathers.

The first of these characteristics may at present pass as valid, as the specimen in Leyden is said to be an older male on which the comb would have to appear if it were peculiar to the species. The question is still open, however, whether or not the information as to the sex is sufficiently authentic. The second point, however, is not at all correct. Shaw faithfully mentions the white edges on the pinion feathers, second order, plainly observed by me when I examined the London specimen (1833) which had only been concealed by the awkwardness of the taxidermist who had covered them with the neighboring black feathers, and which on our better colored specimen even present a narrow outer wing band (as the reproduction shows). Finally, it can only be attributed to the disfiguring mistreatment of the British specimen that in the older description Herr Temminck, having seen the wings extend several inches beyond the tail, believes them to be unusually long and therefore declares a new difference between both species. When the wings are laid properly they have exactly the same build and the same relationship to the neighboring parts of the feathers as those of the condor.

The true distinguishing characteristics which are very evident to the eye lie in the shape of the head and beak and in the form of the feathers.

The head of the California vulture has a much larger circumference and stronger build than that of the condor. Although in the latter the high fleshy comb of the male gives him an extremely stately head decoration, the bony structure of the beak is more delicate and slender, as just above the nostrils the bones of forehead and nose slope towards the middle of the beak and the branches of the lower jaw also narrow before ending at the tip (of the beak), which is enlarged, bladder-shaped, and covered with a horny substance. In the California vulture, however, the bridge of the nose is arched above the openings in a high and wide curve and only in front of them slopes down in a continued curve to the horny tip of the beak, which is not larger in circumference than the part of the beak behind it, covered only with skin. Moreover this horny sheath differs in its smaller circumference as it covers only the fourth part of the space from the front eye rim to the point, while in the condor it covers much more than a third (almost half) of this space. A comparison of our reproduction with Herr Temminck's lovely picture of the head of a condor (494th plate) will very clearly show these points of contrast; yes, even that so mistreated specimen of the British Museum and the picture taken of it show in the bony structure the extremely strange formation of this beak, which deviates from all similar formations. The disfiguration of that specimen consists mainly in the fact that both the horny sheath and the soft covering have been enveloped in an even coating of colored varnish so that it is impossible to tell where one ends and the other begins.

What is not visible in these profile pictures is the remarkably deep indentation on the reverse side of the horny sheath of the upper beak. It extends a good half inch down between the side edges of the horny sheath while in the condor the whole back edge of the horny sheat is only slightly ridged. This new difference noted can be expressed by saying that the space between the nostrils and the upper middle of the horny sheath edge of the California vulture is twice as large as that of the condor.

The further differences in the formation of the head are: the feathers reaching just to the forehead between the eyes, that is, the whole pate is bald as well as an entire lack of any trace of feathers on the throat and nape of the neck.

Fig. 14. Deppe's specimen in the Berlin Museum; model for the Lichtenstein plate; photograph by A. J. van Rossem.

The feathering of the body itself differs mostly in the long-extended narrow, almost lineal shape of all the feathers in the neck ruff, and on the breast and belly, and in the great elasticity of the shaft which has on both sides equal widths of a lighter (lead-gray) coloring running down to the point, causing a fine tracing over these parts, while breast and belly of the condor are covered with broad even shining black feathers, and his neck ruff consists of shaftless, soft and snow-white feathers. If besides these, another characteristic be required it is shown in the lack of the flesh flap which the condor of both sexes has on the lower throat, or the white coloring of the cubital cloak feathers on the under side of the wing, which are black on the condor like all his other under plumage.

Finally it should be pointed out more in detail that the white in the tracing on the outer wing, as mentioned above, is found in the edges of the inner wing feathers of the second order, that is, in their basal portion, partly also, however, in the points of the large cloak feathers, each of which has a black band through which this white point is regularly separated from the ash-gray root. Thereby a tracing is produced which shows anew the relationship with the very similar condor wing which differs only in its clearer and richer drawing.

The remaining parts agree completely in measurement as well as in coloring with those of the condor only that the black is everywhere less shiny and less evenly thick.

Measurements

Entire length from point of beak to end of tail	4 feet*	
Length of the beak from the point of the hook to the back edge of the nostrils		3¾ inch
" from here to the middle of the eye		1½ "
" from eye to edge of bald spot on the occiput		2 "
" of wings from the wrists to the point of the 4th (longest) primary	2 "	8 "
" of the tail	1 "	1 "
" of the extending part of the tail feathers beyond the points of the wings		3 "
" of the tarsus		4 "
" of middle toe without the claw		4½ "
" of the claw on it (on the curve)		1¾ "

* Our male condor measures 4 feet 9 inches, the female 4 feet 4 inches, thus showing more difference than Herr Temminck thought. The condor specimen measured by Herr v. Humboldt measured (see *Recueil d'observations de Zoologie I*, p. 58) only 3 feet 3 inches, Paris meas., or 3 feet 1 inch, Rhine meas.

Unfortunately Herr Deppe tells us nothing further about this stately bird except that it was found in the cordillere which is not far from the New California coast and runs parallel with it. Nuttall, who knows the bird only from Temminck's reproduction, includes it in his ornithology of the United States to make it more complete, and justifies this by reminding us of the Lewis and Clark tale of seeing a large black vulture in the Rocky Mountains, which could only have been this one. This would then give an idea of approximately how far to the east it is found.

Coming to a systematic naming, the direct relationship with the condor and king vulture could not be better shown than by following Dumeril, who includes these three and several others under the generic name *Sarcoramphus*, which, although it originally pointed to the fleshy comb, is not less suitable here, as almost the whole beak is covered with loose waxy skin and only the point shows the horn substance covering.

Lichtenstein here leaves the vexed question of vulture classification about where he found it, contributing nothing in this lengthy discussion to clearing up the general perplexity regarding a proper grouping of the New World species. That he continued perplexed himself is indicated by his later conclusion that all three specimens then accessible must be females, and that the male was still unknown. He postulated the absence of carunculations on the male without altering his opinion that the California species belonged with *Sarcoramphus*, while most of his contemporaries, with the exception of Lesson, remained divided as to whether it should be placed in this genus or in *Cathartes*. Two years after Lichtenstein's paper was published Lesson set the species aside in a genus of its own which he named *Gymnogyps*, and while he buried it in a non-ornithological periodical, there is no reason to believe that other systematists of that time were in ignorance of his views in the matter. Especially is this true of his Parisian confrere Lafresnaye, who as late as 1849 (in vol. 3 of d'Orbigny's "Dictionnaire Universel d'Histoire Naturelle") was in agreement with Lichtenstein. Whatever may have been the reason, the name *Gymnogyps* was not adopted, and the generic distinctness of the California Condor was not again recognized for over thirty years, when Ridgway established *Pseudogryphus* in 1874. Not until 1901 did the lynx-eyed Richmond discover and restore the long lost *Gymnogyps*.

Under circumstances requiring no discussion here, Audubon retired to Charleston in the winter of 1836 and prepared the drawings of "upwards of seventy figures" for dispatch to his London engraver. These drawings were based on ninety-three specimens taken by Townsend in the far west, and represented species new to Audubon's great folios which were then nearing completion. Whether the California Condor in juvenal plumage, later described in Audubon' letterpress but not figured, was in this lot, or was included in the material received personally from Townsend after his return to Philadelphia, is nowhere stated. The question of chief interest here is which of the adult specimens known to be in existence at that time served as the model for Audubon's mammoth plate, numbered CCCCXXVI. If there was a specimen of an adult on this side of

Fig. 15. Havell's folio plate of Audubon's drawing.

the Atlantic at that time, there is no indication of it in any printed reference known to the compiler. Had Townsend returned with a desirable adult specimen, the authorities of the Philadelphia Academy would certainly have exercised their prior right, as part financers of the expedition, to claim so rare and priceless an item for their own fast-growing collection. Such an item does not appear on Cassin's list of the Vulturidae owned by this institution in 1849, where only an adult from California is listed. In a special report published the following year Cassin says (Proc. Acad. Nat. Sci. Phila., 4, [Dec. 1849] 1850: 259):

> There is also now in the possession of the Academy, and intended for its museum, though not yet presented, a valuable collection made by our fellow member Mr. E. L. Kern, who has been attached as artist to several of the expeditions of Col. Fremont, and is now in California. This was collected by Mr. Kern during the expedition of 1845, and contains numerous specimens of such interesting species as *Cathartes Californianus*...."

However, Audubon was devious and persistent, and since the well known story of how he secured Townsend's material fails to itemize specimens or species, there may have been adults along with the juvenal condor. Somewhere in his autobiographical notes he states that during the spring of 1835 he completed thirty-three drawings in London for engraver's copy, and in vol. IV of the letterpress, published in 1838, he says (p. xxii): "I am also much indebted to the Council of the Zoological Society of London, who have never ceased to furnish me with whatever American specimens their valuable museum contains, allowing me to take them to my house." Here is evidence enough that in the event he was in need of a model for the California Vulture plate the Douglas birds were accessible, with the added advantage of his being able to study them at leisure in his own studio.

When Havell's great aquatints came to be copied in miniature on stone to accompany the octavo edition, several of the small reproductions used in the first printing were so unsatisfactory to Audubon as to require changing or doing over, and thus several of these prints exist in two states. The condor plate is one of these and the difference can be seen in the small halftones reproduced here (figs. 16, 17).

To the great loss of American letters, Audubon never saw the California Condor in life, and was forced to quote what life history came to him second hand. But he left his regret in print (Ornith. Biog., 4, 1838: viii):

> It was my wish to cross the Continent of America, gaze on the majestic wilds of the Rocky Mountains, wander along the green valleys of the Oregon, and search the shores of the Pacific Ocean and a portion of North California; but circumstances denied me the pleasure anticipated.

The long succession of famous sea captains and lords of navies who touched the western shores of North America up to the early nineteenth century, whose names and the names of their ships are known to most students, had much to say of our "natural productions," and their reports and narrations sometimes contain descriptions and even colored plates of birds new to the world of ornithology. Many of these voyageurs had among their officers competent naturalists, who returned voluminous and often important accounts of their field experiences to their superiors, supporting their notes with specimens. In the aggregate these contributions to the vertebrate sciences constitute no mean assemblage of important zoological material. It is significant, however, that throughout the entire range of the immense literature that has grown up around these voyages there is scarcely a paragraph of original matter in reference to our condor. The sailing of Vizcaino's fleet up to anchorage in the vicinity of a dead whale was a fortuitous circumstance that alone enabled the observant friar to secure the intimate data he recorded; and Menzies' chance meeting with a lone condor, perched within easy range,

Fig. 16. Audubon's octavo lithograph; first printing.

Fig. 17. Audubon's octavo lithograph; second printing.

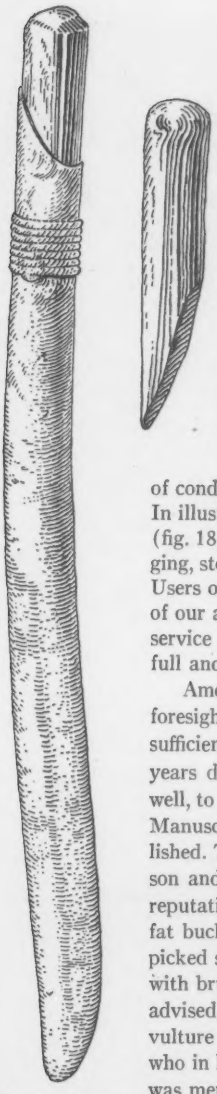


Fig. 18. Primary quill of a California Condor adapted for carrying gold dust; natural size; drawn by John L. Ridgway.

was an accident of good luck. Such opportunities seem to have been denied most of the others, as their combined observations add little or nothing to the bird's history. The extreme shyness of *Gymnogyps* may in part account for this, as its fear of man is unquestionably inherent and of prehistoric origin.

Dating back to the colonial period of California history, the story of playful vaqueros lassoing gorged condors for the purpose of pitting them against eagles in some rude arena has become monotonous through much repetition, although a full and satisfactory description of such an unequal contest has not been traced. It is very doubtful if any frontiersman ever used so large and impractical a substitute for a lost pipe stem as a condor quill, but the story has come down through a long line of compilers who have not overlooked Douglas, and who never fail to throw in for good measure two jet black spherical eggs in a grass-lined nest. And, finally, there may have been a lone forty-niner who once attracted some local attention by storing his stock of the precious dust in a necklace of condor quills, but it is indicated in the books as a general practice. In illustration of its capacity for such a use, a primary quill is shown (fig. 18), exact size, as drawn by Mr. John L. Ridgway, with the rigging, stopper and all, indicated in accordance with approved tradition. Users of the weed, especially those who adhere to the lowly corn cob of our ancestors, will note how ill adapted such a monster tube is for service as a pipe stem. No account of our condor could be considered full and complete with these hackneyed references omitted.

Among early California pioneers there was an occasional literate foresighted enough to keep a journal of events and observations of sufficient importance to warrant later publication, while others in after years drew on their memories, and no doubt their imaginations as well, to satisfy the general clamor for authentic data by eye witnesses. Manuscript material of both kinds is still being unearthed and published. The daily bread of these wilderness breakers was largely venison and bear meat, and with them the big vulture had won an evil reputation as a despoiler of their hard won provender. If they shot a fat buck and returned to the distant cabin for a pack horse, a clean picked skeleton greeted their next sight of the kill. Covering the deer with brush or pine boughs was of no avail against sharp eyes already advised, but they were to learn what the Indian knew of old, that a vulture is drawn to his food by sight alone. Such a pioneer was one, who in later years won his spurs in work with birds, but who in 1847 was merely one of the trail blazers striving to carve out a homestead for his young family. This hunter-naturalist was Andrew Jackson Grayson, whose life story is the romance of early western ornithology known to every student. His reminiscences of the California Vulture are included in Walter E. Bryant's biographical sketch (Zoe, 2, 1891: 52-53):

It is the largest rapacious bird of North America and ... it is better known in California than elsewhere, where, previous to the civilization of that country, it was very abundant, approaching in large flocks the near vicinity of the Missions, where it contended with the coyote for the offal and carcasses of cattle slaughtered for their hides and tallow. In the early days of California history it was more frequently met with than now, being of a cautious and shy disposition the rapid settlement of the country has partially driven it off to more secluded localities. I remember the time when this vulture was much disliked by the hunter for the ravages upon any large game he may have killed and left exposed for only a short length of time. So powerful is its sight that it will discover a dead deer from an incredible distance while soaring in the air. A case of this kind happened with myself whilst living in the mountains of Marin County, California, in the year 1847. At that time my main dependence for meat wherewith to feed my little family was my rifle. The hills and mountains there abounded in deer and other game and it was not difficult to kill a deer any day, but to kill a fat one could only be done by accident or the acuteness of a skillful hunter in making such a selection. A four-point buck in the month of July could always be depended upon as savory venison with ribs and haunch covered with tallow. One fine morning I had shot a large and exceedingly fat buck of four points, on the hills above my little cabin. Taking a survey of the sky in every direction I could not discover a single vulture, and, as my cabin was but a short distance from the spot, I concluded not to cover my game as I could return with my horse to pack it home before the vultures would be likely to trouble it. But for this lack of caution I was doomed, as in many other events in my life, to disappointment. I was gone about two hours, when, on returning, I found my game surrounded and covered by a flock of at least a dozen vultures, and others still coming. Some so far up in the heavens as to appear like a small black speck upon the clear blue sky. So busy were they, tearing and devouring the deer and fighting among themselves that I approached quite near before they saw me, when all arose, some flying a short distance and perching upon the rocks and sides of the hill, while others less gorged were sailing around taking a bird's-eye view of the half consumed deer and my chagrin. Their greed in feeding upon a carcass and their aerial movements remind me of the black vulture (*C. atratus*), and like that bird they have often been known to gorge themselves so as to be unable to fly.

The California vulture seems to be entirely restricted to the regions west of the Rocky Mountains and its geographical range does not extend as far south as Cape St. Lucas, nor north to Washington Territory. Its flight when ascending is a quick movement of the wings and alternate sailing in circles till out of sight. It soars to an immense height and is endowed with such a far-seeing eye that it is able to discover over a great expanse of territory any dead animal which may happen to be exposed to view.... The home of this vulture is amid the clouds and in the wildest mountain regions it seeks for a retreat and to repose, usually preferring to perch upon rocks than upon trees.

These frontiersmen usually spoke of the bird in a casual manner with reference to little more than its being an ever present nuisance, but not so with John Clyman. This hardy observer sought details of behavior and flight to enter in his diary, but like many another who wondered at the immensity of the creature, he stretched the wings both physically and morally. Clyman's original diaries, contained in nine small notebooks covering the years 1844 to 1846, are owned by the Huntington Library, and have been published in full by the California Historical Society (Special Publication No. 3, 1928: 1-247). Some of the pertinent entries are (pp. 182, 183):

Napper Creek, California, August 16, 1845. We had rare sport shooting deer Bringing in nine skins in the Evening the most of the meat being left on the ground for the wolves and vultures and of the latter the country seems to be remarkably well stocked. Beside the raven and Turkey Buzzard of the states you see here the royal vulture in greate abundance frequently measureing Fourteen feet from the extremity of one wing to the extremity of the other.

September 8, 1845. Killed five deer one large grizzeled bear one Royal vulture this is the largest fowl I have yet seen measuring when full grown full 14 feet from the extremity of one wing to the extremity of the other Like all the vulture tribe this fowl feeds on dead carcases but like the bald Eagle prefers his meat fresh and unputrefied they seem [to] hover over the mountains in greate numbers and are never at least fault for their prey but move directly and rapidly to the carcase cutting the wind with their wings and creating a Buzzing sound which may [be] heard at a miles distance and making one or two curves they immediately alight and commense glutting.

Another pioneer manuscript of interest owned by the Huntington Library, and marked for publication only after the recent discovery in an eastern collection of a

long lost part, is that of J. Goldsborough Bruff. There is entered here one of the few records that may be considered authentic of the California Condor on the east slope of the Sierra Nevada, supported by a description and measurements of a bird taken. There is also a pencil drawing of two perched condors which, though incorrect as to certain details, unmistakably represents the species. The codex that was examined had the added interest of being marked and annotated throughout in the familiar scrawl of Dr. Elliott Coues, who handled it in 1898 and left the clue that there must be a missing volume.

Also of this period is Alfred Robinson's translation in 1846 of Fr. Geronimo Boscana's "Chinigchinich," a detailed account of the origin, customs, and traditions of the Acagchemem Indians centered around Mission San Juan Capistrano, about midway between San Diego and Los Angeles. Robinson, whose own story as an American resident of Spanish California is well known to history, intended merely to write an introduction to the Boscana material, but carried it to such length that it has been republished several times as a separate book. The "Chinigchinich" was not republished in America until 1933, when it was issued in a sumptuous format with annotations by John P. Harrington, of the Bureau of American Ethnology, who has also included an immensely valuable bibliography.

Boscana's account includes several references to the condor and of the vital importance to the Indians of its plumage for use in their ceremonial equipment. The part of chief interest here is the author's description of the annual condor killing rite, which can be presented no better than in his own words. This matter has been transcribed from the first edition, 1846 (pp. 291-293):

> The most celebrated of all their feasts, and which was observed yearly, was the one they called the "Panes," signifying a bird feast. Particular adoration was observed by them for a bird resembling much in appearance the common buzzard, or vulture, but of larger dimentions. The day selected for the feast was made known to the public on the evening previous to its celebration, and preparations were made immediately for the erection of their Vanquech, into which, when completed, and on the opening of the festival, they carried the Panes in solemn procession, and placed it upon the altar erected for the purpose. Then, immediately, all the young, married and unmarried females, commenced running to and fro, with great rapidity; some in one direction and some in another, more like distracted than rational beings; continuing thus racing, as it were, whilst the elder class of both sexes remained silent spectators to the scene. The *"Puplem"* painted as has been heretofore described, looked like so many devils, in the meantime dancing around their adored *"Panes."*
>
> These ceremonies being concluded, they seized upon the bird, and carried him in procession to the principal *Vanquech* or temple, all the assembly uniting in the grand display—the Puplem preceding the same, dancing and singing. Arriving there, they killed the bird without losing a particle of its blood. The skin was removed entire, as a relic, or for the purpose of making their festival garment, "Paelt." The carcass they interred within the temple in a hole prepared previously, around which all the old women stood collected, who, while weeping and moaning most bitterly, kept throwing upon it various kinds of seeds, or particles of food, and exclaiming at the same time "Why did you run away? would you not have been better with us? you would have made pinole as we do, and if you had not run away, you would have not become a 'Panes.'" Other expressions equal in simplicity were made use of, and as the ceremony was concluding, the dancing commenced again, and continued for three days and nights, accompanied with all the brutalities to which they are subject.
>
> The Indians state that said "Panes" was once a female who ran off and retired to the mountains, when accidentally meeting with "CHINIGCHINICH," he changed her into a bird, and the belief is, that notwithstanding they sacrificed it every year, she became again animated, and returned to her home among the mountains. But the ridiculous fable does not end here; for they believed, as often as the bird was killed, it became multiplied; because every year all the Capitanes celebrated the same feast of *Panes*, and were firm in the opinion that the birds sacrificed were but one and the same female. They had no evidence, however, of where she lived, or where she originated, and neither were the names of her parents known. The commemoration of the festival was in compliance with the commands given by Chinigchinich.

In one form or another this ceremony is believed to have been practiced generally throughout the range of the vulture, and is understood to exist even at the present time, with symbolism replacing the use of an actual bird. The indispensable apron worn at this feast, as well as at other celebrations, was a woven belt from which was suspended the longest condor feathers obtainable, but which today is made up of any feathers accessible, such as eagle, hawk, raven, and even owl, spliced together for the length demanded by tradition. Cave deposit and other ancient material has been found indicating that the ancestors of these people spliced even their condor feathers for greater length, which suggests that the long extinct *Teratornis* may have been at the bottom of this myth. So imperative was the demand for nestling condors that a nest was considered the inviolable property of the Indian who found it, and became a personal possession of the greatest importance and value, to be handed down from father to son. The extensive and constant demand for feathers, as well as for the birds themselves, must have operated as a considerable check on *Gymnogyps,* and will need to be taken into account by the person elected to compose the obituary of the species.

The mad scramble of adventurers from the four corners of the earth to get into the California gold fields in 1849 and the early and middle fifties resulted in a flood of books and pamphlets in many languages, most appalling to an amateur bibliographer, and the present compiler admits to but a superficial combing of this field of little promise. Enough of it was examined to establish these two facts: the "big red-headed buzzard" succeeded fairly well in keeping out of the way of these armed transients, and it unquestionably attained its "maximum wing spread" during this brief but hectic era. A few records of occurrence of more or less reliability were discovered, and at least one title of outstanding interest was noticed as worthy of special mention. This is the narrative of John Woodhouse Audubon, second son of the immortal John James.

This son was to realize in part the expressed longing of his father to gaze on the wonders of the far west, but on his overland journey across Mexico and the southwest to arrive amid these scenes he was to experience a more bitter taste of the wilderness than any suffered by the august parent's own pioneering. Also like his father's early losing struggle to mix business with ornithology, the son's California venture was a dismal failure resulting in heavy financial loss. Professor Herrick has said (Audubon the Naturalist, 2, 1917: 297-298) that John W. was an observant and self-reliant collector in the field and an animal painter and draughtsman of no mean powers; and that he was probably as devoted to adventure and sport as his father had ever been in his palmiest days.

John W. Audubon's account (Audubon's western journal; 1849-1850), not published in full until 1906 (Arthur H. Clark Co.), is an entertaining and stimulating account of a naturalist's adventures and observations in new fields, and the book has long ago passed out of print. At the time it was being recorded, the author well knew that the nest, egg, and downy young of *Gymnogyps* were entirely unknown, and while he believed he had seen the nest at a distance it is quite obvious he was mistaken. The younger Audubon's few references to the vulture are (pp. 176, 182, 218, 221, 223, 224):

> [November 7 or 8, 1849.] As we stood looking at all this [Mission San Luis Rey, in southern California], from a hill higher than the one on which we were, swooped a California vulture coming toward us until, at about fifty yards, having satisfied his curiosity, though not mine, he rose in majestic circles high above us, and with a sudden dash took a straight line, somewhat inclining downwards, towards the mountains across the valley and was lost to sight, from actual distance.
>
> Tulare Valley [late November or early December, 1849]. Here, for the first time, I saw the Lewis woodpecker, and Steller's jay in this country. I have seen many California vultures and a new hawk, with white tail and red shoulders.
>
> March 29th [1850]. The Tuolumne here, one mile above Hawkin's Bar, comes out of a gorge

in the hills ... and makes its way to the San Joaquin, ninety or a hundred miles from the mouth of that stream .... The buzzards in this upper country are just pairing. I have seen three or four couples of the California vulture but have not secured one yet.

April 5 [1850]. Leaving Hawkin's Bar for Green Springs. Overhead we saw the heavy, sweeping motion of the [California] vulture's wing, or watched his silent circles.

April 9th [1850]. This morning we crossed the river [Tuolumne] and after a trot of about five miles came to the cañon. I made my way to the lower end called Indian Bluff and my sketch was finished by probably five o'clock, but having no watch I cannot tell. Here I saw the nests of the California vulture, but on the opposite side of the river, now an impassable torrent.

This indeed would have been an observation worth recording had it been correct, as but one or two early nesting records exist for the Sierra Nevada; in fact records of mere occurrence in these high mountains are few and far between.

At the time young Audubon was making his way up the San Joaquin Valley on his journey to the diggings, and was seeing the many California Condors mentioned in his diary under date of December, 1849, the body of William Gamble was being laid at rest on a hillside overlooking the Feather River. The sad death of this promising American ornithologist had been the indirect result of a winter crossing of the Sierra Nevada, and what was to have been his second exploration of California was thus terminated before it had fairly begun. Gamble is said to have been a protégé of Thomas Nuttall, and being greatly stimulated by the success of Townsend on the Columbia, he joined a party of trappers for the overland journey and reached California in 1842, returning to Philadelphia in 1845, with a small but choice collection of birds. His activity in the field during this period marked the beginning of California ornithology, and "his final report forms the basis of all subsequent work" (Stone, Condor, 18, 1916: 11). As Gamble was the second American ornithologist to reach the Pacific coast, and the first to collect in California, his remarks on the vulture in this report (Jour. Acad. Nat. Sci. Phila., ser. 2, 1, 1847: 25) seem worthy of quoting in full:

This immense and interesting bird, rivalling the Condor in size, and confined exclusively to the Pacific coast, is particularly abundant in California during winter, when they probably come from Oregon, as they are said to disappear from the region of the Columbia at that time.

Although it does not display the fimiliarity of the Turkey Buzzard, yet they are often found in the vicinity of towns.

It is very voracious, and nothing less than the carcass of a horse or cow can make a meal for many of them; but such food is abundant, at lease in the fall of the year, when the dry pasturage has been destroyed by fire, accidentally or intentionally, by the Indians. These fires extend over large tracts of country, and in consequence many cattle perish, as well as from the summer drought.

It is not uncommon to see them assemble with the gulls, and greedily devour the carcasses of whales which have been cast ashore; they will also frequently pursue wounded game.

The male in perfect plumage has the skin of the head and neck orange-yellow, and the irides carmine.

Gamble would have given some measurements here if he had ever held a specimen of this bird in his hands, but he must have had a live condor at fairly close range to have seen the color of the iris. Townsend had given the color of the iris as hazel brown, which is further evidence that he, Townsend, did not secure an adult on the Columbia. Gamble probably could have taken a specimen of the vulture during the long period he collected in California, but he seemed to be chiefly in search of novelties.

As reported by Cassin (in Proc. Acad. Nat. Sci., Phila., 4, 1850: 259), E. L. Kern, another member of the Philadelphia Academy, attached as artist to several of Fremont's expeditions, had collected a specimen of *Gymnogyps* in California in 1845, and this seems to be the first adult deposited in any eastern museum. Still another Philadelphia ornithologist, Adolphus L. Heermann, spent three years in California, returning to the east in 1852 with the largest collection yet assembled in the State, and later was back

on the coast as a member of Lieut. Williamson's Pacific Surveys party. He failed on both visits to take the vulture, but his report on the birds taken during the survey includes the following account (Pacific Railroad Surveys, 10, pt. 4, 1859: [29]):

> Whilst unsuccessfully hunting in the Tejon Valley, we have often passed several hours without a single one of this species being in sight, but on bringing down any large game, ere the body had grown cold, these birds might be seen rising above the horizon, and slowly sweeping towards us, intent upon their share of the prey. Nor, in the absence of the hunter will his game be exempt from their ravenous appetite, though it be carefully hidden, and covered by shrubbery and heavy branches; as I have known these maurauders to drag forth from its concealment and devour a deer within an hour. Any article of clothing thrown over a carcass will shield it from the vultures, though not from the grizzly bear, who little respects such flimsy protection. The California vulture joins to his rapacity an immense muscular strength; as a sample of which it will suffice to state that I have known four of them, jointly, to drag off, over a space of two hundred yards, the body of a young grizzly bear, weighing upwards of a hundred pounds.
>
> A nest of this bird, with young, was discovered on the Tuolumne River, by some Indians who were sent there in search of a horse-thief. It was about eight feet back from the entrance of a crevice in the rocks, completely surrounded and masked by thick underbrush and trees, and composed of a few loose sticks thrown negligently together. The effluvium arising from the vicinity was overpowering. We found two other nests of a like construction and similarly situated; one at the head of the Merced River, and the other in the mountains near Warner's Ranch. From the latter the Indians annually rob the young, and having duly prepared them by long feeding, kill them at one of their great festivals.
>
> At Santa Cruz I saw three or four pairs of vultures constantly, from February to October. At almost all times they could be seen sailing far overhead; but I did not, after much watching, trace them to their nests. They are doubtless constant residents.

Dr. S. W. Woodhouse, surgeon with Capt. Sitgreaves' expedition, saw two birds near San Jose and reported only that they were shy and solitary (Report Expd. down Zuni and Colo. Rivers, 1853: 58). Dr. J. S. Newberry, surgeon with the Pacific Surveys party in Northern California and Oregon, had more to say regarding the species as observed in 1855, and stated in the sixth volume of the "Pacific Railroad Surveys" (1857: 73):

> A portion of every day's experience in our march through the Sacramento Valley was a pleasure in watching the graceful evolutions of this splendid bird. Its colors are pleasing; the head orange, body black, with wings brown and white and black, while its flight is easy and effortless, almost beyond that of any other bird. As I sometimes recall the characteristic scenery of California, those interminable stretches of waving grain, with, here and there, between the rounded hills, orchard-like clumps of oak, a scene so solitary and yet so home-like, over these oat-covered plains and slopes, golden yellow in the sunshine, always floats the shadow of the vulture.
>
> This vulture, though common in California, is much more shy and difficult to shoot than its associate, the turkey buzzard, (*C. aura*), and is never seen in such numbers or exhibiting such familiarity as the two species, *C. aura* and *C. atratus*, the efficient scavengers which swarm in our southern cities. We had, however, on our first entrance into this field, many opportunities of shooting this bird, but were unwilling to burden ourselves with it. After we left Sacramento valley, we saw very few in the Klamath basin, and none within the limits of Oregon [1855]. It is sometimes found there, but much more rarely than in California. In size, the Californian vulture is second only to the condor, attaining a length of four feet, and a stretch of wing of ten feet, or more. A fine specimen was presented to Dr. Sterling on his return to San Francisco, and was for some time kept alive. He succeeded, however, in tearing from his legs the cord which confined him, and escaped. He ate freely the meat given him, and was a magnificent bird.

This was the most intimate account that any of the Government parties had so far included in their reports, and it was widely quoted at the time. This same year, 1855, the first specimen was received at the California Academy of Sciences, and reported in volume 1 of the "Proceedings" (p. 70a-b). The founding of this scientific body marked the beginning, among other things, of a lively local interest in *Gymnogyps*, and of serious efforts on the part of certain ornithologically-minded members to secure for science the still unknown facts of the bird's nidification. Most interested of all in this matter

was Alexander S. Taylor of Monterey, a contributor to historical and scientific periodicals of the day, who was already in correspondence with British ornithologists. He had published some notes on the vulture in 1854 in "The California Farmer" with a view to gaining additional information from ranchers and others living close to the bird's haunts. Assembling all accessible material, including careful measurements with detailed description of a fresh specimen taken on the beach at Monterey, he put together the longest article yet written on the species and sent it to J. H. Gurney, of Norwich, England. Gurney was probably at that time second to none as an authority on the raptorial birds of the world, and he communicated the article, with a short introduction of his own, to "Newman's Zoologist," where it was published in 1855 (vol. 13: 4632-4635). The account received much attention and was widely reviewed, causing interested museum authorities here, as well as abroad, to renew their demands for California Condor material. This first article by Taylor contains some rough anatomical notes not before published, as well as some other miscellaneous information that was new. Like Douglas he included an incorrect description of the egg received at second hand from what he considered a reliable source; he did state that but a single egg was laid by the species.

Gurney was especially eager to have the species represented in his great collection of raptors in Norwich Castle Museum, and Taylor was soon able to furnish him with the first known egg and downy young (figured as color plates in the Ibis, 2, 1860, pls. VIII-IX), together with adult material (4 specimens listed in the 1894 catalogue). Not to be anticipated by foreign descriptions of these unique items, the enthusiastic Californian communicated an account of their discovery to the "San Francisco Herald" (May 5, 1859), a copy of which Gurney relayed to P. L. Sclater for editorial notice in volume 1 of the Ibis (pp. 469-470), quarterly of the newly founded British Ornithol-

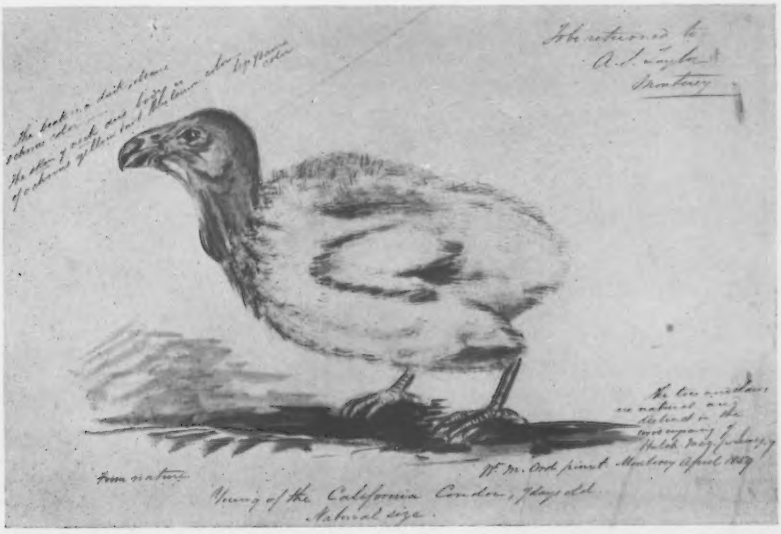


Fig. 19. W. M. Ord's original drawing for first published portrait of downy young; courtesy of Dr. Alexander Wetmore, United States National Museum.

ogists' Union. The following month Taylor began publishing in "Hutchings' California Magazine" (vols. 3-4, 1859) his famous second article, "The Great Condor of California," which ran through three issues, with an extended account of the egg and young. All this matter was printed concurrently in "The California Farmer."

This second article, or series of articles, constitutes a notable and most interesting contribution to Gymnogypsiana, and deserves a more extended notice than can be given it here. Drawings of the egg, downy young, and adult were prepared by W. M. Ord, of Monterey, for reproduction on wood blocks, and are creditable enough considering the time and place of publication. Ord's long lost original drawing of the chick, important as being the first, was located in the files of the National Museum and kindly loaned by Dr. Alexander Wetmore. An account of a specimen taken in Napa County as it "flew off with a nine pound hare it had killed," published in the "Daily Alta California" in 1858, gave rise to the highly imaginary drawing accompanying the last installment. The lengthy account is not of course without flaws, as the author included about everything told him regarding the bird, but it succeeded in laying at rest several hoaxes, that no matter how innocently perpetrated, had received a wide currency over a long period of time. Not the least notable result of Taylor's publication is that it brought into general usage (at least in the west) the name California Condor, as no attention had ever been paid Bonaparte's use of the term in 1833.

In the interim between Taylor's two publications, the Smithsonian Institution issued Dr. T. M. Brewer's "North American Oology" (1857), in which (pp. 6-7) a false description of the egg, different from any of the others, was given. Only students of a past generation can understand the importance attributed formerly to the study and


THE EGG AND YOUNG OF THE CALIFORNIA CONDOR.*

From Nature. *W. M. Ord, pinxt. Monterey, April, 1859.*

YOUNG OF THE CALIFORNIA CONDOR, SEVEN DAYS OLD.

It is a strange fact in the natural history of our Pacific domain, that though the California Condor (Sarcoramphus Cal.) has been known to the scientific world since mentioned by Shaw, in 1779, the eggs have never been met with nor properly described from nature, but simply from hearsay. Both Douglass (1827) and Town-

* Published also in the S. F. *Herald* of May 9th, 1859.

Fig. 20. Woodcut from Ord's drawing; published in "Hutchings' California Magazine," 1859.

collecting of eggs, or why the unknown egg of this vulture was a matter of such widespread curiosity, with everyone eager to be first to describe it. Dr. James Trudeau had made a careful drawing of an egg laid by a captive vulture in the Jardin des Plantes in Paris, which was claimed to be a California Vulture, and had presented the sketch to Brewer for what it was worth. Brewer unhesitatingly accepted the evidence as genuine and described the drawing in great detail, being troubled only by the possibility of an egg laid in captivity differing from one laid by the same species in a wild state. No live California Vulture had yet reached Europe, and the Paris bird must have been some unidentified female from Asia or Africa. The egg was beautifully marked with reddish-brown blotches on a rich cream-color ground!

The real reason why so many qualified collectors among the early naturalists who operated in California returned home laden with every ornithological treasure but a skin of *Gymnogyps* is understood best by those few ornithologists who have ever really attained the difficult mountainous terrain occupied by the species. A few of the great number of such visitors who left empty handed in this particular were: La Perouse, in 1786; G. H. von Langsdorff, 1806; Dr. Alex. Collie, G. T. Lay and Lieut. Belcher, 1826-1827; Dr. Paolo Emilio Botta, 1827-1828; and Dr. Adolphe Simon Neboux, 1837. Nuttall tried with every means at his command to secure a specimen during his stay in Monterey in 1836; Townsend was all but frustrated in one of the chief objects of his long journey. Others who failed were: William Gamble, 1842-1845; Titian R. Peale, 1840; Col. Andrew J. Grayson, 1846-1857; William Hutton, 1847-1851; J. W. Audubon, 1849; J. G. Bell, 1849; A. L. Heermann, 1849-1854; Dr. S. W. Woodhouse, 1851; James Hepburn, 1852-1869; Dr. J. S. Newberry, 1854; John Xantus, 1857-1858. A great many of these would have undergone any hardship to take the rare vulture, and could well have succeeded had they been equipped to gain the distant heights where the birds spent most of their time. Taylor had intimated that the chief obstacle preventing his better acquaintance with the species was the expense involved in meeting it on its own ground. It was necessary to be well mounted and in company with mountain men who knew where to look for the common roosting place or the nest cave. Pack animals were needed to carry in supplies and equipment for a campaign against wild nature at her very worst. The occasional loss of a sure-footed pack mule testified to the insecurity and hazard of the trail, and often skilled cragmanship was necessary to gain an objective. These difficulties are nowhere better reflected than in Professor Baird's laconic entry in his classic volume IX of the "Pacific Railroad Surveys Reports" (1859), where he states (p. 5): "A single specimen in the National Museum was collected at the mouth of the Columbia River by J. K. Townsend." This was the immature bird purchased by Audubon, who after it had served his purpose, presented it to Professor Baird for the national collection. In this same year Drs. Cooper and Suckley, naturalists on the northern route of the Pacific Surveys, reported their failure to meet the species on the Columbia, although Dr. Cooper was reluctant to disregard a distant sight record of his own.

Professor Baird's immense influence on the development of zoological science during his era is exemplified in the results attained by the corps of young enthusiasts scattered throughout the Pacific Railroad Surveys and the several other Government explorations in the west during and after his official life. Most of these men had been personally selected by him, and many of them had received their first instruction and training under his stimulating guidance. Among this group, not already referred to, whose names will always be associated with one of the most active and productive periods in the history of western ornithology, were Dr. James G. Cooper, Henry W.

Henshaw, and Robert Ridgway. Dr. Elliott Coues, the great individualist, can scarcely by classified as anybody's disciple, although he dominated the entire school. Dr. Cooper's life in California covered a period of nearly fifty years, beginning in 1855 with a six weeks collecting trip in the Santa Clara Valley, and ending with his death in Hayward in 1902. During his active years he collected over a major part of the state, and although he often mentioned the vulture in his writings, there is no evidence there that he ever took a specimen, or indeed that he ever became intimately acquainted with the species in nature. In the first of two articles devoted exclusively to *Gymnogyps* (Land Birds, 1870, pp. 495, 496-502), he included the published observations of Douglas, Taylor, Newberry, and Heermann, which he prefaced with a short sketch of his own, as follows:

> This large bird, second in size only to the condor of South America, among the Raptors, appears to be limited to the western part of the United States, not having been yet obtained in Mexico, and rarely north of the Columbia River.
>
> It is most abundant in the hot interior valleys of California, where the large herds of cattle furnish abundance of food; but I saw none along the Colorado, or east of the San Bernardino Mountains, the scarcity of large animals there being a barrier to their migration, although from their lofty flight and extensive vision they probably sometimes see a dead or sickly antelope and follow it to the more desert regions of the State, in which they may find also some mountain sheep. The cattle killed at Fort Mojave attracted but two turkey-buzzards there during five months, and *no* vultures.
>
> I have not seen many of these birds along the sea-coast where most of my later collections were made, and none on the islands or in the highest Sierra Nevada. They are said, however, when other food is scarce, to feed on dead seals and whale meat, though I have not seen them do so.
>
> At Monterey I saw in Dr. Canfield's possession a full-grown living specimen, which he had raised from the nest. Being fed on fresh meat, it had no offensive smell, and its plumage was clean and shining. It was gentle and familiar, but stupid, spending most of its time dozing on the fence.

Dr. Cooper's second article (Zoe, 1, 1890: 248-249), contained the first alarm sounded on behalf of the fast vanishing species, and one of the first published appeals for its protection. Containing an interesting reminiscence, this article is worthy of full transcription:

> In May, 1872, when travelling by wagon from San Diego to Los Angeles and encamped near the coast about what is now the southern boundary of Orange County, I was examining the geology of the low hills bordering the sea-beach, when I noticed a strange-looking and large bird sitting on a grassy hillside some distance from me. As I approached it, being on foot and not attempting to conceal myself, as I was armed only with a hammer and unprepared to attack it, I of course expected to see it fly away. But although, as I soon saw, it was a California vulture, generally a very shy bird, it seemed on this occasion quite the reverse, and I walked up to its side as it stood there with eyes wide open, as unconcerned as if it considered me a brother biped. I could see no sign of injury or disease about it; on the contrary, it was in splendid spring plumage and apparently a male. Nor did it seem a very old bird, but every feather was as clean and perfect as if painted in one of Audubon's finest plates. Its head and neck were of a light orange, showing that it was not a young bird, and it showed no sign of having surfeited itself on carrion lately. As I had never succeeded in shooting one of these birds, on account of their shyness and because I rarely carried a rifle, shot being nearly useless for killing them, I debated whether I should not take advantage of this lucky chance, and kill it with my hammer. It never moved except to open its bill in a lazy way when I pointed the hammer at it. But I was loaded with fossils and had several miles to walk to camp, so I did not feel like carrying a heavy bird, which looked at least as large as a twenty-five pound turkey. It seemed an unfair advantage to take of a sick or starving, but harmless if not useful bird, so I left it to fulfill its destiny.
>
> Now, whatever may have been the matter with this vulture, there is no doubt that the species is in process of extinction. To prove this, it is only necessary to read the notes compiled by Mr. L. Belding, in the "Land Birds of the Pacific District," one of the Academy's "Occasional Papers" issued this year, page 24 [cited beyond]. Taking these notes in the order of their dates, from Nuttall, 1840, to Belding, 1890, it is evident that the bird has rapidly grown scarce. I can testify myself that from my first observation of it in California, in 1855, I have seen fewer every year when I have been in localities suitable for them. There can be little doubt that unless protected our great vulture is doomed to rapid extinction.

The causes of this are not hard to perceive. Besides poison used to kill wild animals on which the vultures then feed, two others may be given. One is the much less abundance of cattle, sheep, etc., kept in those parts of the State, where grazing is giving way to agriculture and fruit-raising. The other is the foolish habit of men and boys, who take every opportunity of shooting these birds, merely because they are so large and make good marks for their rifles when they want to practice at vulture's heads as a preparation for the annual turkey shooting in the fall. Some may even believe that the vultures injure their live stock, but with little reason.

Several years ago some liberal-minded legislator got a bill passed in this State forbidding the killing of this bird, for the reason that it is useful as a scavenger and not injurious. Very few of the present inhabitants of California probably know that there is such a law, and its annual publication as one of the game laws might help toward enforcing it. The vulture is certainly worth preserving if possible, for it is one of the native curiosities of the west coast, known from Lower California to Puget Sound, and the largest land bird of North America. In some of the Gulf States even the turkey buzzard and little black vulture are protected by law on account of their usefulness in consuming dead animals.

Both Taylor and Dr. Cooper, as well as others, have referred to Dr. Canfield, of Monterey, as a source of information regarding the rare vulture, Taylor especially quoting him at length. Dr. Canfield was one of the Academy members who had interested themselves in securing reliable data on the bird, and as he was often in the field as a hunter of big game and had lived three years in camp in the mountains, he came to know something of the species at first hand. References to his possession of a downy young, which he raised until it had attained adult plumage, have been found in several places, including Dr. Cooper's first article cited above. This specimen later became famous as the first living individual of this species to reach Europe, where the most was made of it as a unique exhibit in the gardens of the Zoological Society of London, and where also after its death the most was made of its carcass as an object of study by comparative anatomists, although to this day the myology of the species is as unknown as that of the dodo. Dr. Sclater's notice of the arrival of this important addition to the Society's zoo (Proc. Zool. Soc. London [34], 1866:366) follows:

The Secretary called the attention of the meeting to a fine specimen of the Californian vulture (*Cathartes californianus*, Shaw) recently added to the Society's living collection. This scarce bird had been presented to the Society by Dr. Colbert A. Canfield, of Monterey, California, through the intervention of Prof. Baird of the Smithsonian Institution, Washington, and kindly assisted in its passage across the Isthmus of Panama by Capt. J. M. Dow.

The Zoological Society availed itself of still another unique opportunity offered by this specimen in having the first portrait made of a living California Vulture. This was carefully drawn on wood by J. Smit, a pupil of the immortal Joseph Wolf, and it remains today one of the most faithful likenesses of a juvenal *Gymnogyps* ever published. A stereotype of this woodcut was furnished Professor Baird in exchange for one of the downy young (made from a photograph of the same specimen when first obtained by Dr. Canfield), and the two were published in the "Proceedings of the Zoological Society of London," Cooper's "Ornithology," and Baird, Brewer, and Ridgway's "Land Birds," as well as in papers by Coues and Shufeldt. Most unfortunately the larger portrait has sometimes been referred to as that of an adult, from which it of course differs materially. The slim black head of a juvenile in contrast to the heavy-jowled, massive, red head of the adult had misled Taylor into believing that this was the characteristic difference between the sexes, and this view was held by many others at that time, possibly even by Professor Baird himself.

Dr. Cooper's casual reference to the decimation of vultures by poison (strychnine) during the cattle era of California history recalls that this was formerly so universally accepted as a fact that no writer, scientific or popular, ever deemed it necessary to cite supporting evidence. The rancheros poisoned meat to check the numerous mammalian

predators, and thus the countless herds of horses and horned cattle inhabiting the range of *Gymnogyps* acted as a check rather than as a benefit to the bird, as it also fed on the poison. This was a logical enough conclusion prior to a general knowledge of the toxic resistance possessed by vultures, and it is not strange that the long accepted dic-

Fig. 21. Portrait of juvenal *Gymnogyps* by J. Smit published in the Proceedings of the Zoological Society of London, 1866, and in Cooper's Ornithology," 1870, and in several other publications.

tum has only recently been challenged. Nor is it strange that the literature is so entirely barren of any eye witness corroboration of the lethal effect the poison was claimed to have had on the birds. Only a single reference is citable in this connection, and it rests on evidence too questionable to warrant discussing. The inference to be drawn from this, as well as certain other testimony, is that decimation of the species by poison was merely assumed to account for a seemingly sudden decrease in its numbers. There is no valid reason to believe that these birds were ever abundant anywhere during historic times, or that the gradual appearance in their midst of a vast new food supply had any effect whatever on the remnant of this fast expiring race. Whatever forces operated to cause the extinction of the giant mammalian fauna of the Pleistocene operated with equal fatality to a numerous vulturine retinue, of which *Gymnogyps* and *C. aura* are

the sole survivors in California. That the huge *Gymnogyps* was able to survive to the present time even as a remnant bespeaks its abundant vitality in the presence of overwhelming odds against it, to which man has added comparatively little.

The regret has been expressed above that Audubon's lack of an opportunity to paint a characteristic word picture of the giant vulture in its wilderness environment was a distinct loss to literature. It may be said that almost as great a loss was suffered by Dr. Elliott Coues' failure to see the bird but once, and then only at a distance. While the rhetorical ecstasy of Audubon has nothing in common with the pungency of Coues' earthy but dressy handling, each possesses the power to impart an irrepressible urge to go out and watch some wild birds. The fluent doctor would have left a classic memoir on the species had fortune ever favored him with a camp site in a vulture roost, or had chance placed him in the way of a feeding congregation of the mammoth scavengers. He reported seeing the vulture at Fort Yuma in 1865. On his later historic collecting excursion in southern California with Dr. Cooper, he missed it entirely. This observation at Yuma is the first published record for Arizona, and although there are several other sight records for the State, none has ever been supported by specimens, and all have been disregarded by California ornithologists. Dr. Cooper believed the absence of big game on the desert acted as an entirely effective barrier to the vulture's invasion of Arizona, forgetting that the Yuma region is in sight of the San Pedro Mártir Mountains of Lower California, a stronghold of *Gymnogyps* at that time. In this connection Mr. W. Lee Chambers received in 1935 what he considered satisfactory confirmation of a belief long held by him that the vulture's normal range extended from the San Pedro Mártirs to well within the rugged mountainous regions of southwestern Arizona, even considerably north of Yuma. Attending a rifle shoot held that year near Yuma where there was a grand foregathering of ranchers and mountain men from far and wide over the district, he satisfied himself through personal interviews that more than one of those present knew the bird well. Parts of this region are so rugged and austere that no one save an occasional hardy prospector has ever penetrated very deep into the mountains.

A few important references to *Gymnogyps* during the late sixties, not already mentioned, may be included here briefly in their chronologic sequence. In 1867, in the Ibis (p. 254), J. H. Gurney published the following note:

> It is well known that in both species of the genus *Gypaetus* the sclerotic coat of the eye is visible, forming a brilliant orange-red ring encircling the iris.
>
> I have been under the impression that no raptorial birds except the *Gypaeti* exhibited this peculiarity; but on examining today [23rd March, 1867] the fine immature specimen of *Cathartes californianus* now in the gardens of the Zoological Society, I have observed a similar formation of the eye of that Vulture, with the exception of the sclerotic coat being only visible round the posterior portion of the eye, thus forming a semicircle instead of a complete circle as in the *Gypaeti*. In the Californian Vulture at the Gardens the sclerotic coat is of the same orange-red hue as that of the *Gypaeti*, the colour of the iris being dark brown.

In the same year Professor Thomas H. Huxley contributed to the Proceedings of the Zoological Society of London his famous paper on the classification of birds and on the taxonomic value of the modifications of certain of the cranial bones observed in that class. He discussed here certain anatomical characters common to the New World vultures, and as he had a complete skeleton of *Gymnogyps* among his material, he was able to include this important species. In 1868 Dr. Cooper contributed the zoological matter to T. F. Cronise's "Natural Wealth of California," an important book of that period, but was unable to include any original observations on the vulture, his article being entirely compiled. J. Ross Browne's useful "Resources of the Pacific Slope" appeared first as a government report, and the first of a long line of reprints by various

publishers was issued in 1868. This book treats the California Vulture as a resident of both the Californias, and contains some matter by A. S. Taylor.

In 1871 James Orton, in an article on the condors and hummingbirds of the equatorial Andes (Ann. and Mag. Nat. Hist., 4th ser., 45, 1871:185-192), anticipated Ridgway by nine years in noting the inferior size of the Andean Condor in comparison with the California Vulture. He also discussed the relationship between the two species and concluded that the true condor should stand alone. He quoted Von Tschudi as saying the latter species cannot carry, when flying, a weight of over ten pounds. The question of whether or not a California Vulture is able to carry any weight at all grasped in its claws is one on which avian anatomists have very decided negative convictions, all supposed field observations to the contrary notwithstanding. The printed story cited earlier and used by Taylor, that a vulture of this species was shot while flying away with a nine-pound hare it had killed, and was later found to have a fourteen-foot wing spread, is very shaky on three counts. Had the bird been loudly vocal the yarn would have been complete. Also in 1871, Dr. Cooper communicated some notes from California to the American Naturalist (4, 1871:756-758) in which he stated that ten years prior to that time the vulture was one of the most characteristic land birds of the Monterey region. This note indicates that the decade from 1861 to 1871 saw a gradual and final withdrawal of these birds from this one time center of their population, and it constitutes one of the few published records on which to base a chronologic range-chart of the species. However, the range of mountains extending down the coast from Monterey continued to harbor a decreasing number of the birds until about 1933, when the last breeding pair is supposed to have disappeared from the San Simeon district. The present last stand area might properly be considered an extension of this same range of mountains. Any attempt to construct a map indicating by decades the steadily receding limit of the vulture's range would necessarily be based on such inadequate data, and so largely dependent on mere guesswork, as to be entirely useless.

Early in 1873, Lorquin, a San Francisco naturalist and taxidermist who was a member of the California Academy of Sciences, described in the "Proceedings" of that year a specimen of the California Vulture recently taken by him. He stated that the bird differed from any of the published descriptions in that there was down on the neck instead of this member being bare, and added that the wing spread was nine feet and ten inches. This was of course an immature individual, and the first specimen in this particular sub-adult plumage so far mentioned in any of the Academy publications. The wing measurement, which in this instance may be assumed to be correct, indicates adult size, and it is unfortunate that the describer failed to mention whether there were signs of the head color changing. This head and neck color, in its transition from the duskiness of youth to the red of advanced maturity, evidently passes through several stages or phases that have never been described. While nothing definite is known of the time elapsing between the first and final stages in the color change, it would seem that captive birds when taken young and confined over a long period of years, as in the case of the Washington Zoo specimens, would offer an excellent opportunity to assemble data to this end. However, so far as the writer is aware, nothing has been published on this matter. On observing from a blind a mixed flock of fourteen of these vultures feeding at close range, the present writer was quite unprepared by anything he had read for the amazing differences in several of the head and neck color patterns. What was taken to be the first sign of emergence from adolescence was exhibited in one individual by a very light flesh-colored patch, roughly wedge shaped, extending from the ruff up the back of the neck half way to the base of the skull. This patch contrasted sharply with

the duskiness of the rest of the neck and head, but would not have been visible had the bird been facing the observer. Another bird in this group confirmed a description and watercolor sketch made by Major Allan Brooks from one of the Washington captives in 1931 and as yet unpublished. This bird's lower neck and throat was deep pinkish, merging into a bluish plum color about at the base of the skull, and the entire head was a rather bright yellow only faintly tending toward orange. A few oldsters in the feeding crowd were noticeably heavier in build and had the entire neck and head a solid deep orange red. It might be suggested that the head color in this species may be in some measure subject to changes under emotional stress, as in certain other birds, but evidently students have thus far lacked sufficient opportunity to assemble any pertinent data.

During 1874 several important ornithological publications appeared containing mention of the California Condor. All important prior references to the species based on observations considered authentic were brought together in the third volume of Baird, Brewer, and Ridgway's "Land Birds." In this summation nothing new was offered except Ridgway's generic name *Pseudogryphus*, which has already been referred to above. The first volume of the "Catalogue of Birds in the British Museum" (1874) contained a supposedly complete bibliographic synonymy, and the species was allocated to Sharpe's genus *Œnops*. The Menzies type, two specimens secured through exchange with J. H. Gurney (part of the material received by him from A. S. Taylor), and a skeleton from the Zoological Society, were listed in this catalogue. The Henshaw collection of American birds, purchased by the British Museum eleven years later, added substantially to this material. Coues compiled in his "Birds of the Northwest" (1874) a selected synonymy, and later the same year contributed to the American Sportsman a featured article on the vulture, which was entirely assembled from published sources, all of which have been noticed above. The first edition of this author's combined "Manual of Instruction and Check-list" was also issued in 1874. H. W. Henshaw, in his "Birds of Utah," published first in 1874 as a separate (Annals N. Y. Lyc. Nat. Hist.), and included the same year in the "Wheeler Survey Report," published a record of two of the great vultures seen near Beaver, Utah (in 1872). This record, as in the case of Coues' Arizona record, was later forgotten by the author. It is difficult to believe that two such eminent field naturalists as Coues and Henshaw could have been misled in these observations, and a doubt will always exist in the minds of some students that they did not actually see this species in these extralimital regions. Coues never enjoyed another opportunity to meet the vulture in a wild state, but Henshaw in later years saw something of the bird during his California explorations, and acquired as many as nine specimens (three in 1884 and six in 1885). This entire series was probably collected by hired hunters, as he states in his "Autobiographical Notes" (Condor, 22, 1920:8) that the first three were so secured, and he most certainly would not have overlooked the opportunity to relate in the same memoir such high adventure as the taking of any of the other six.

In an appendix to the Wheeler report (Ann. Rept. Geog. Surv. West 100th Merid., 1876, p. 265), Henshaw says:

> Our opportunities for an acquaintance with this Vulture were most brief and unsatisfactory, and were limited to seeing two or three individuals warring on the wing in the mountains. So far as I could learn, they descend rarely into the valleys during the summer months, and then only when attracted by the sight of some dead animal, their keen sight enabling them to detect the presence of food at very long distances. Dr. Taylor informed me that at Santa Barbara they were of quite common occurrence, remaining, however, most of the time in the neighboring mountains. I hear they breed, seeking the shelter of caves, in the most inaccessible situations.

It seems probable that the numbers of this huge bird have very much diminished during the last few years. So large and conspicuous an object could scarcely fail to attract the attention of any chance rover of the wilderness, yet its presence was almost undetected by our parties. As is well known, this bird is easily killed by strychnine, and as this poison has been in almost constant use for a term of years in the destruction of wild animals, it seems highly probable that great numbers of these birds have suffered a like fate from eating the carrion.

According to the observations of earlier naturalists, it was numerous throughout most of California, and extended its range on the north to the Columbia. Near Mount Whitney, in September and October, I frequently saw the carcasses of sheep which had lain for days, and in one instance the body of a huge Grizzly Bear, which had died from poison, was in the final stages of decomposition, yet in no case had any of these been visited by Vultures, a fact which seemed to argue their total absence from this region.

Henshaw again stresses the poison rumor in the same series of reports, where he states in 1879 (p. 315):

Nor was the California vulture (*Pseudogryphus californianus*) observed along the river [Columbia in October], although, judging from the accounts of Cooper and Suckley, it formerly periodically visited its shores, attracted thither by the dead salmon, which, during "the run" often line the banks. The accounts of these authors date back to 1854, and since that time the numbers of this huge vulture have been so diminished by the use of poison, intended to kill off wild animals, that it is now in comparison almost extinct, and the sight of a California vulture is at present a rare event in localities where a few years ago it was very numerous.

In 1877 Colonel A. G. Brackett, U. S. A., contributed a paper on the birds of Wyoming to "Forest and Stream" (pp. 389, 404), in which he stated that the list was made up of species that had been taken at different times by himself and his friends. Further on, however, he states that the dates given are those on which the birds were taken or seen, and he reports *"Cathartes californianus"* from Fort Sanders, southeastern Wyoming, on May 13, 1877. Another dubious record of the same nature, and also by an army officer, is that of Major J. S. Campion from some point in the mountains of Colorado. The Major's book of reminiscences is not very well known, but the record is too doubtful to more than mention. Among a large number of other references to the vulture during the late seventies, Sclater stated that the bird presented to the Zoological Society by Dr. Canfield in 1866 was still alive in 1877 and on exhibition in the Society's gardens. The following year Sharpe included the bird under his name *Œnops californiana* in an important paper on the geographical distribution of the Accipitres (Jour. Linn. Soc., 13, 1878:1-26).

Appearing in rapid succession at the end of this decade, the first three installments of Dr. Coues' great bibliography placed in the hands of ornithophiles generally a working tool of superlative value. This indispensable compilation, which covers the years 1612 to 1879, yielded the present compiler many titles in reference to the California Vulture that otherwise might have been missed. The author's bibliographical accuracy has sometimes been challenged by critics who have often been qualified to pass judgment on only its less vital details, but this has in no way clouded his effulgent scholarship. Possibly the greatest desideratum in the entire field of ornithological literature is a continuation of this great catalogue down to a late date, in the identical manner as planned by Dr. Coues.

The last title of the seventies worthy of mention is the first title of Lyman Belding to give any information on the California Condor. This paper, containing a partial list of the birds of central California, was edited by Robert Ridgway who published it in 1879 (Proc. U. S. Nat. Mus.). This brief note was included (p. 437):

The California Condor seems to be very rare in this region. I have seen it on no more than two or three occasions in Yuba County in winter, and do not think I have seen it at any other place. They probably visit the vicinity of Marysville only in winter, and are never common.

The decade 1880-1890 was a most fruitful period in America for ornithological publications, and our vulture came in for an increasing share of attention. Robert Ridgway especially had much to say of it during these years and contributed importantly to its literature. The national collection was still poor in material representative of this rare species, and Ridgway made special efforts, as both Professor Henry and Professor Baird had made in previous decades, to remedy this deficiency, but met with no immediate success. Like many an avian systematist before him, he viewed the highly involved tangle of vulturine synonymy as a problem requiring extended consideration, and in 1880, with characteristic patience and vision, he applied his talents to its solution. Only that part of this important paper (Notes on the American Vultures [Sarcorhamphidae], with special reference to their generic nomenclature. Bull, Nutt. Orn. Club, 5, 1880: 77-84), which is of present interest, is cited:

Pseudogryphus californianus. This species appears to have become excessively rare in California, having been nearly, if not quite, exterminated in many parts of the State, through the agency of poisoned carcases exposed for the destruction of bears and wolves (*cf.* Henshaw . . . , 1876). It may not, perhaps, be generally known,—at least the fact has been almost wholly overlooked by authors,—that this species is fully the peer of the Condor in size, the length of the wing and tail averaging even decidedly greater. It is not, however, quite so strongly built, the beak and feet being proportionately weaker. Apropos of the wide disagreement of authors as to the alar expanse of the Condor, I have been led to try a very simple method of determining what *should* be the stretch of wing in that species and *P. californianus*, with a result which is undoubtedly approximately correct. This method is based upon measurements of the wing bones of these two species and *Cathartes aura*, and the application of the "Rule of Three," as follows.

The maximum length of wing in *C. aura* is 23 inches, the humerus measuring 6.00 inches, and the ulna and radius 7.25 inches, making the total length of one outstretched wing 36.25 inches. The maximum alar expanse of this species is 6 feet, or 72 inches. In *S. gryphus* and *P. californianus* the maximum total length of wing is 55.50 and 58.25 inches, respectively. Therefore, assuming that the primaries have about the same proportionate length in the three species, we have, by applying the aforesaid rule, the following result:—

Sarcorhamphus gryphus (length of outstretched wing, 55.50 inches).
36.25 : 72 :: 55.50 : 110.23 = 9 feet 2 inches.

Pseudogryphus californianus (length of outstretched wing, 58.25 in.).
36.25 : 72 :: 58.25 : 115.65 = 9 feet 8 inches.

Allowing for individual variation in both species, the average alar expanse of each may be set down at about 9 feet, *P. californianus*, at least, perhaps sometimes reaching 10 feet, while it is quite certain that the largest individuals of either would not much exceed, if indeed they reach, an extent of 10½ feet.

For sake of comparison I give below measurements of certain bones of *S. gryphus*, *P. californianus*, and *C. aura*, taken from fully adult examples of each.

Humerus	10.50	10.75	6.00
Ulna and radius	12.00	12.50	7.25
Femur	5.75	5.25	
Tibia	8.60	8.75	
Tarsus	4.75	4.50	
Head	5.90	6.75	
Wing from carpal joint	33.00	35.00	23.00

In revising the nomenclature of certain North American birds early the same year, Ridgway (Proc. U. S. Nat. Mus., 3, 1880:1-16) again mentioned his generic name *Pseudogryphus*, arguing its validity by citing the above paper. In the same volume of the "Proceedings" (pp. 163-246) the vulture is referred to three times in his "Catalogue of the Birds of North America." Listing some special desiderata among North American birds (Proc. U. S. Nat. Mus., 4, 1881:207-223), he again called attention to the lack of both adults and downy young of *Pseudogryphus* in the national collection; and the same year (Bull. U. S. Nat. Mus., 24:40), he used the name Californian Condor. Writing J. H.

Gurney in 1884 he said: "This species is so nearly extinct that we have been trying unsuccessfully for years to get additional specimens." Gurney, contrary to Sharpe, had adopted Ridgway's name *Pseudogryphus*, agreeing that the vulture belonged apart from all other species, though he pointed out to Ridgway an erroneous character he had later added to his definition of the genus, that of the possession of fourteen rectrices. In support of this he cited two specimens in his Norwich Museum collection as each having only twelve tail feathers. On checking the matter and reporting it fully, Ridgway (Auk, 2, 1885:167-169) found the character untenable in that it is variable. He noted in this article (Remarks on the Californian Vulture [*Pseudogryphus californianus*] the fact, previously mentioned by Gurney, that Audubon's plate represented fourteen rectrices, whereas in his description the number is given as twelve. Stating further that in both the Douglas specimens in the Zoological Society collection the number is fourteen (quoting Swainson and Richardson, Fauna Boreali-Americana, 1831, pp. 1-3), he thus recalls evidence in addition to that given above that Audubon used these two skins in London to secure the facts represented in his great portrait of the species. After Ridgway's article was put in type, as if finally in response to his several published appeals for fresh material, four specimens in the flesh were received at the National Museum. Ridgway's last important contribution to mention *Pseudogryphus* during this decade was the first edition of his celebrated "Manual of North American Birds" in 1887.

Dr. Robert W. Shufeldt, who during this period was gathering momentum in his pioneering of the field of American avian anatomy, called attention to the claw on the index digit of the Cathartidae (Amer. Nat., 15, 1881:906-908), where he stated, in part:

> At the present writing there are two rather imperfect skeletons of *Pseudogryphus californianus*, and two mounted specimens, the latter being unquestionably birds of the year, in the Smithsonian Institution. In the younger, or at any rate the smaller of these last, we find this claw present and very prominent, though it occurs in both birds....

The skeletal material mentioned here formed the basis of that section devoted to *Pseudogryphus* of an exhaustive and elaborately illustrated memoir on the osteology of the Cathartidae. This important paper by Shufeldt was included in Part I of the 12th Annual Report, U. S. Geological and Geographical Survey of Territories (1883: 727-806, pls. XV-XXIV) though the author's separate, accompanied by an incomplete set of the plates, was issued during the previous year. The paper announcing the discovery of the claw, and the later osteological study were both very favorably received in interested circles, especially in England where zootomists were in the ascendancy. The latter paper, with its accompanying lithographic plates of the important skeletal elements of *Pseudogryphus*, remains today one of the most outstanding items in the long list of Gymnogypsiana.

Deserving of mention is the immense plate of the California Vulture in the fourth part (1882) of Charles B. Cory's "Beautiful and curious birds of the world." This portrait is a hand-colored lithograph from a drawing by Mrs. Cory, and is nearly, if not quite, the elephant folio size employed by Audubon. In his notice of this publication, William Brewster (Bull. Nutt. Orn. Club, 8, 1883:55-56) referred to the vulture as "Our North American Condor." In the same volume (pp. 21-36) Brewster reports a collection of birds made by Frank Stephens in Arizona and states that a large vulture seen at Cave Creek, March 7, [1881,] was thought by Stephens to be *Pseudogryphus californianus*. This is one of the several published sight records for Arizona that, owing to the full competence of the observer, may justly be presumed to rest on something more than mere suspicion or conjecture.

The second edition (1882) of Coues' "Check-list and Ornithological Dictionary" and the second (1884) and third (1887) editions of his "Key to North American Birds" are important references of this period. H. H. Bancroft's seven-volume "History of California" contains matter in several places relative to the vulture, but is chiefly valuable for its bibliography of some four thousand titles with text, classifying this important material. T. H. Hittell's "History of California" is another standard reference of about the same time. J. H. Gurney's "List of the Diurnal Birds of Prey" of 1884, Major Charles E. Bendire's circular listing the egg of *Gymnogyps* as needed in the national collection, the first four editions of Oliver Davie's "Egg Check List," Dr. J. B. Holder's compilation in an American edition of Wood's "Animate Creation," Leonhard Stejneger's item in the fourth volume of the "Standard Natural History," and the first edition (1886) of the "Code of Nomenclature and Check-list of North American Birds," of the American Ornithologists' Union, are all citable titles in reference to *Gymnogyps*, though none contain matter not previously published.

Dr. Barton Warren Evermann, as a resident in southern California during the early eighties, published a paper in 1886 (Pacific Science Monthly, 1:77-89) in which he noted the occurrence of the California Condor in the high mountains of the coast range in Ventura County, and stated that it descended to the canyons only to feed. This refers to the identical region where today the few remaining individuals of the species are making their last stand. This paper was republished in the Auk (3, 1886:86-94), and in the same year this author contributed some notes on the yellow-billed magpie in the form of a narrative in which he describes the take-off and flight of *Gymnogyps* (Amer. Nat., 20, 1886:608). Another resident observer, Clark P. Streator, published two articles in the Ornithologist and Oologist (11, 1886:67; 13, 1888:30), the latter titled "Notes on the California Condor." He describes the flight and speculates on the sudden decrease in numbers, adding that during his travels through all parts of the state only three living specimens ever came under his observation. Thus it seems that California ornithologists of sixty years ago were no better off in this particular than are those of today, who in order to get even a far glimpse of the gigantic vulture must virtually outfit an expedition. However, there were formerly no legal barriers to entering the bird's home areas.

Sometime during the eighties the Mexican ornithologist, Alfonso Herrera, published in "La Naturaleza" something on the California Condor that indicated its occurrence in the Valley of Mexico. The original reference has not been seen by the compiler, but Salvin and Godman refer to the matter in the third volume on Aves of their "Biologia Centrali-Americana," (1897-1904) where it is stated (p. 136) that Herrera advised them there were no trustworthy data of the occurrence of this species in Mexico. This included Lower California, as no record of the occurrence of this vulture in this region had as yet appeared in print.

In 1887 W. Otto Emerson included a note on the species in a report of observations made in San Diego County, stating that the bird was seen at close enough range to hear the swish of wind through the immense wings and to see the bright colors of the bare head. G. Frean Morcom and Charles H. Townsend also published California Condor notes in 1887. In his catalogue of the birds of Lower California (Proc. Calif. Acad. Sci., ser. 2, 2, 1889:278), Walter E. Bryant has the following to say:

> Mr. Anthony is the only one who has reported this species from the peninsula; he has observed them at several places, from sea level to an altitude of 11,000 feet. From the fact of their primary and secondary quills being prized by Mexican and Indian gold miners for use in carrying gold dust, an opportunity to kill a vulture is never allowed to pass unimproved.

A. W. Anthony's own report on the birds of San Pedro Mártir, Lower California (Zoe, 4, 1893:233), contain these notes:

> The first evidence that I found of the occurrence of the condor in Lower California was the finding of a dead bird in Guadaloupe Valley, forty miles south of Ensenada and near the coast; later another carcass was found in the dry barren hills east of El Rosario, about 30° north, which was the most southern point [and so remains today] where positive evidence of its occurrence was obtained. My brother, W. W. Anthony, reported seeing these birds at one time near Real Del Castillo in the San Rafael Valley.
>
> On San Pedro Martir they are of rather common occurrence, being seen daily about the meadows at altitudes of 8000 and 9000 feet. The Indians told me that their nests were to be found on the high cliffs of the gulf slope and others informed me that they built in the tops of large pines.
>
> I greatly doubt the last statement, however. Every Indian and Mexican gold miner is provided with from one to six of the primary quills of this species for carrying gold dust, the open end being corked with a plug of soft wood and the primitive purse hung from the neck by a buckskin string. All of the dead birds that I saw in Lower California had been killed for their quills alone.

Anthony later added this note (Auk, 13, 1895:137):

> In 1887 I found the bones of a recently killed California Vulture (*Pseudogryphus californianus*) at a water hole about twenty miles north of San Fernando, in a country exactly similar to that about the mines, but after questioning a number of natives, I concluded that its occurrence there must have been unusual and that this point was probably the limit of its range.

Anthony's observations are believed to constitute the first published eye witness records of the occurrence of *Gymnogyps* in Lower California, although the fact that the vulture's range included the peninsula had been casually mentioned in print before this. Even one or two of the earlier Spanish sources might be interpreted as referring to the larger vulture as a resident there, but these are too brief and indefinite to warrant inclusion in this place. No exact and definite information in this matter has been traced by this compiler in any publication prior to the above. Since Anthony's time, not many ornithologists have had occasion to visit the San Pedro Mártir Mountains, to which general region the vulture's peninsular range is confined. S. N. Rhoads reported the bird from the eastern side of these mountains in 1905 (Proc. Acad. Nat. Sci. Phila., 57, 1906:689), A. W. North in 1907 (Sunset Mag.) and in 1910 (Camp and Camino in Lower California, pp. 26, 271) recounted experiences with the species in the same region. Dr. E. W. Nelson, who explored the entire peninsula more thoroughly than any other naturalist, found the vulture common in the northern mountains in 1905, and was able to secure specimens. In his final report of 1921 (Mem. Natl. Acad. Sci., 16:22, 115, 130), which had been preceded by a popular account in 1911 (Natl. Geog. Mag., 22:471, 473), Dr. Nelson included all he was able to learn of *Gymnogyps* in this southern extremity of its range. A few other collectors are known to have explored the San Pedro Mártirs, but have published nothing in the nature of condor notes. Among these, Chester Lamb has told the writer that he saw the species there often during the twenties. Laurence Huey also knows the region and its condors from long association. Griffing Bancroft, of San Diego, like so many enthusiasts in California, is said to have failed in Lower California to attract condors to bait set near a blind in order to secure photographs at close range. In the summer of 1935 C. D. Scott spent a week traveling about the Sierra San Pedro Mártir searching for condors and interviewing natives as to the presence of *Gymnogyps* there at that time. Only a single bird was reported as seen during the entire year, and he concluded that it had about disappeared forever from those parts (see Condor, 38, 1936: 41-42; and Nature Mag., 28, 1936: 368-370).

The last decade of the nineteenth century, with which this already too lengthy review must be brought to a close, was marked by the rise of a new generation of students in California who made much of their opportunity to advance the interests of vertebrate

science on the Pacific coast. The enthusiasm of this group of eager young zealots was given purpose and direction by the work of able predecessors in this field, and culminated during the decade in two most signal achievements, that of the founding of the Cooper Ornithological Club in 1893, and the inauguration of its twin series of publications in 1899. That the memory of *Gymnogyps* should be perpetuated in the Club's emblem, as well as in the name of its regularly issued periodical publication, is of course entirely fitting and proper.

By 1890 the general interest in the great bird had mounted about in proportion to its decrease in numbers, and it had become a traditional creature known by sight to but few men. By the end of this decade the species had been reduced to a few small groups of individuals occupying limited areas in the wildest and most inaccessible mountains of southern California and Lower California. As the race dwindled, the published references to it multiplied and the bibliography of the species during this ten year period is too immense to permit notice here of more than some of the highlights. Lyman Belding opened this period with a long paper on the land birds of the Pacific district (Occas. Papers Calif. Acad. Sci., 2, 1890: [1]-274), containing a compilation of data on *Pseudogryphus californianus* which was contributed in part by correspondents. Among other things he stated (pp. 24-26):

> Generally reported to be a resident of the mountains in this part of the State [San Diego], but not seen here or in any part of Lower California by me, though Col. N. S. Goss informed me that one or more pairs breed near Mr. Crosswaith's ranch about 60 miles south of San Diego. I have not seen one of these birds in the field in ten years. I was told at Tehachapi, in the spring of 1889, that a few still breed between Tehachapi and Tejon Valley.
>
> It is difficult to believe that this was ever really an abundant species in California. It has certainly been very rare in the center of the State north of latitude 38° since the spring of 1856.

Henry Reed Taylor was a familiar figure in western ornithological circles during this lively era, and as editor and publisher of the fondly remembered "Nidiologist," as well as the proprietor of what appears to have been a virtual clearing house for condor eggs, he was enabled to assemble much valuable current data on the species. He read a paper before the California Academy of Sciences on the nesting habits of some raptors that contained matter relative to the nidification of *Gymnogyps,* and between 1890 and 1898 he published at least eleven titles of his own in reference to the species. His paper on the habits of the vulture (Nidiologist, 2, 1895: 74-79, 3 illus.) brought together much new data communicated to him by scattered collectors and others who were especially interested in the species. The same volume contained a separate account of the taking of an egg in San Luis Obispo County by an unnamed oologist, who stated that while the condor succumbs to poison it can safely eat animals that have met death by poison. In the fourth volume of his periodical (1897, p. 58) Taylor published what he claimed was the first photograph ever taken of a live California Condor, an eight months old pet owned by Frank H. Holmes. However, Dr. Canfield had photographed a young bird over thirty years before this, and moreover, it was published in the form of a carefully copied woodcut (Proc. Zool. Soc. London, 1868: 183).

Other contemporaneous titles worthy of notice are: Walter E. Bryant's "An Ornithological Retrospect," and his biographical sketch of Andrew Jackson Grayson (Zoe, 1, 1890: 289-293; 2, 1891: 34-68); John Fannin's "Check List of British Columbia Birds" (1891), in which he states (p. 22) that in 1880 he saw two California Condors at Burrard Inlet; Sharpe's catalogue of osteological material in the Museum of the Royal College of Surgeons of England, listing a complete skeleton of *Gymnogyps* (1891); F. A. Lucas' article (Ann. Rep. U. S. Nat. Mus., 1891: 609-649, pls. XCV-CIV) on animals recently extinct or threatened with extinction—an important resume; Cap-

tain Charles Bendire's extended compilation in his "Life Histories of North American Birds," 1892: 157-161); [The plate of the California Condor's egg in this work is as near perfection as it is possible to attain by any known printing process. The surpassing excellence of the Bendire plates in general, together with some historical data concerning the artist's work in connection with their manufacture, is referred to in "John Ridgway's drawings for the Bendire plates" (Harris, Condor, 29, 1927: 177-181).] Sam Rhoads' Arizona record (Proc. Acad. Nat. Sci. Phila., 1892: 114-115); Dr. A. K. Fisher's report on the ornithology of the Death Valley Expedition (N. A. Fauna No. 7, 1893), in which it is stated (pp. 10, 33-34) that the California Vulture was still tolerably common in certain localities west of the Sierra Nevada; Adolphe Boucard's "Travels of a Naturalist," 1893; R. H. Lawrence's *"Pseudogryphus californianus"* (Auk, 10, 1893: 300-301), containing records of five specimens, and a report by an eye witness who flushed a condor feeding on the carcass of a wildcat, and who saw it fly away with the remains grasped in its claws; H. C. Lillie's compilation (Oologist, 10, 1893: 49a-51a); notice of sale of the Walter E. Bryant collection containing five California Condor skins (Nidiologist, 2, 1894: 55); Sam Rhoads' publication (Proc. Acad. Nat. Sci. Phila., 1893: 39) of W. London's record from Lulu Island, delta of the Fraser River, British Columbia; R. H. Lawrence's record for the San Gabriel Range (Auk, 11, 1894: 76-77) at a time when the species was considered very rare in this region, though Finley and Bohlman were able to take their famous photographs in the same place twelve years later; Bendire's second volume of "Life Histories" of 1895, in which (p. 187) W. B. Judson is said to have found condor feathers in the nest material used by White-throated Swifts in Los Angeles County; W. H. Hoffman's notes on California Condors (Avifauna, 1, 1895: 18-19) mentioning the fact that there were eight perfect skins at that time in Los Angeles collections, and that two specimens in the flesh weighed 21 and 27 pounds, respectively.

Hoffman, who was editor and publisher of the short-lived "Avifauna," also stated

Fig. 22. Postal card from Louis Agassiz Fuertes, 1926, to business office of the Cooper Club.

in these notes that he knew of the existence of but three eggs of this species in American collections, but according to data carefully compiled by Mr. W. Lee Chambers in 1906, eight specimens would have been closer to the actual number. The Chambers list, assembled only after extensive correspondence with owners of egg collections throughout America and Europe, includes complete data on forty-one eggs, with six others known to have been collected but their final destination unknown. These forty-seven specimens are believed to be very close to the actual number preserved in museums and private collections up to the end of 1906. Just how many eggs have been taken since that time will probably never be known, but certainly there are a great many more eggs of the Great Auk extant than there are those of *Gymnogyps*. No attempt has yet been made to take a census of the mounted specimens, skeletons, and skins of the California Vulture in collections.

G. Hartlaub (Abhand. Naturw. Verein Bremen, 14, 1895: 1-43) included the California Condor in a discussion of species threatened with extinction, which caused the editor of the Ibis (1895: 494-495, and again 1896: 411-412) to voice the belief that the species was not so very rare in remote districts of the far west, as a recent observer had seen twenty-six of these birds in the air at one time in the Sierra Nevada. William C. Blake reported (Nidiologist, 2, 1895: 96) the sale of a skin of this species to Rothschild's Tring Museum for the sum of £45. Hiram A. Reid reported (History of Pasadena, 1895: 129) a specimen killed in Punchbowl Canyon, near Pasadena, with a wing spread of ten feet and three inches, and "too heavy to carry home." Joseph Grinnell's first mention of the species is found in this same book (p. 595), where he states under the heading, "Our Native Birds," that *Pseudogryphus californianus* is confined to California.

A. M. Shields, a well known oologist of Los Angeles, assembled some notes on the history, habits, and nesting of the condor by way of introduction to a colorful narrative of the taking of an egg (Nidiologist, 2, 1895: 148-150). Unable to get away himself, he outfitted O. W. Howard and an assistant for a month's collecting in the mountains of San Luis Obispo County, and the youthful collectors returned with the supreme prize. Shields sold this egg to G. Frean Morcom who on his death bequeathed his entire collection to the Cooper Club. The chief interest in *Gymnogyps* during this period was oological, and the exchange value of the egg as a piece of merchandise called for heated arguments among votaries of this so-called science. The several dealers in this class of material issued catalogues indicating both cash and exchange values, and these ephemeral little publications, which have much interest and no little historic value attaching to them, have become very difficult to trace. The egg of the California Condor was always listed but seldom priced in these lists, as no one could supply a specimen and few had the temerity to hazard a guess as to its market value. Taking violent issue with Walter F. Webb, who allowed in his "Manual" of 1895, an exchange value of $25 for the egg, H. R. Taylor proclaimed to the world (Nidiologist, 2, 1895: 100) that he stood ready and eager to pay $250 cash each up to three eggs of this species. It is not a matter of record that he had any takers at this figure.

In his "Official Handbook of the Norwich Castle Museum," 1896, Thomas Southwell includes the following paragraph, apropos of the J. H. Gurney collection of raptorial birds:

> In Case III is a fine group of California vultures, *Pseudogryphus californianus*, with nestling, skeleton, and egg, procured at the same time as the pair in the British Museum; a moribund species, already so rare that when a skin comes into the market it is advertised with the Great Auk and Labrador Duck! Ridgway calls it the peer of the Condor, and it is greatly to be regretted that its destruction by poison is found necessary by stock-growers, for there are now very few left.

The origin of these historic specimens, as well as others sent to Gurney by A. S. Taylor, has been outlined above. During these years a close watch was kept on field collectors in California by the editors of American ornithological magazines, particularly those of the amateur journals dedicated in part to oology, as a result of which it is believed that every egg and every specimen of the vulture retrieved during the nineties, as well as during the first decade of the twentieth century, was duly recorded in print. Certainly no specimen was overlooked during the life of the Nidiologist or the Osprey, or in the first ten volumes of the Condor. The data thus made accessible for what was definitely the most active period during which California Condor material was legally taken in the name of science is important as showing the quite negligible damage done the species by legitimate collecting. On the other hand no figures are, or can be, available to indicate even approximately the number of these great birds annually destroyed by an ever increasing host of deer hunters eager to test their high-powered rifles on any living target. No interested Californian is ignorant of the toll of condor life thus taken during the deer season over a long period of years, and it can only be hoped that the recent tardy exclusion of armed hunters from parts of the condor range may terminate this wanton killing. This closure, brought about largely through the energy and influence of Mr. C. S. Robinson, Associate Forester of the Los Padres National Forest, and of Mr. John H. Baker, Executive Director of the National Association of Audubon Societies, cannot be too highly commended or too warmly appreciated by avian conservationists in general and by the Cooper Club membership in particular. The founding of a fellowship for the sole purpose of making possible an exhaustive study of the birds thus protected is an added benefaction for which ornithologists are indebted to Mr. Baker and the powerful organization he heads, as well as to the efforts of the late Ernest I. Dyer and the late Dr. Joseph Grinnell. The results of this foundation are awaited with eager interest.

John Fannin's record of two California Vultures seen in Alberta (Auk, 14, 1897: 89), between Calgary and the Rocky Mountains, would have been less startling had it been reported from this far region seventy-five years earlier, but nevertheless it adds one more section to the jig-saw puzzle of *Gymnogyps'* extralimital wanderings. Another Arizona record appeared in print about this time (Auk, 16, 1899: 272); Herbert Brown reported that a bird killed near Pierce's Ferry, Grand Wash Cliffs, northwestern Arizona, was described as being of a dark brown color with purplish warts on its neck. It was said to be over a gun length in height and more than three gun lengths in wing spread. R. P. Sharples (Osprey, 2, 1897: 21) recounts the finding of a condor asleep on an egg that proved to be addled. This recalls the fact that several eggs of this species on which exact data exist were found to be in this condition.

Frank E. Beddard, Prosector of the Zoological Society of London, briefly discussed a few of the structural characters of *Gymnogyps* in relation to those of other vultures (Structure and Classification of Birds, 1898, p. 481), referring to this species in his text (p. 473) as *Rhinogryphus californianus*. English systematists generally did not adopt Ridgway's classification until the publication of Sharpe's "Hand-list of the Genera and Species of Birds," 1899, when this leading authority at last came over (p. 241) to *Pseudogryphus*. Another foreign zoologist of this time, E. A. Goeldi, made the belated announcement (Schweiz. für Ornith., Zürich, 1897) that *Cathartes californianus* probably belonged in a separate genus, and this was concurred in by at least one reviewer of the article, who like the author himself had overlooked Ridgway's name of twenty-three years standing. J. E. Harting, then editor of the "Zoologist" (London), communicated to "The Field," an article (1899) under the title "The Largest Birds that

Fly" (republished in Osprey, 4, 1899: 52-56, and in Recreations of a Naturalist, 1906: 330-347), wherein he assembled some valuable comparative data on the weights and measurements of what he believed were the fourteen largest volant species. The South American Condor figures prominently in this discussion and in the table of statistics, but the larger California Condor is not mentioned. The present writer has often puzzled over this conspicuous omission, as it is difficult to believe that a bibliographer of such wide scholarship and experience in ornithophily as Harting possessed could have overlooked Ridgway's proof of the superior size of Gymnogyps.

Reporting on the results of an inquiry into the destruction of our birds and mammals (2nd Ann. Rep. N. Y. Zool. Soc., 1898: [77]-126), William T. Hornaday sounded an ominous warning that impending doom was in store for the California Vulture—poison again. As if to give a more optimistic view of the situation, in reporting on the birds of the Pacific slope of Los Angeles County (Pasadena Acad. Sci. Publ., 2, 1898), Joseph Grinnell said (p. 20):

> *Pseudogryphus californianus.* Tolerably common resident in the mountainous parts of the county. Hardly a day passes in the vicinity of Mt. Wilson without one or more being seen. They undoubtedly breed in one of the precipitous cañons near by. The "Condors" are also frequently seen in the Santa Monica and Simi Mountains. In the latter locality I once saw seven at one time circling overhead. The Condor is not by any means becoming extinct in this part of the State, and if they continue to be as shy as now, there is not much likelihood of their extermination very soon.

Some unique nesting data were communicated by H. R. Taylor (Osprey, 3, 1898:29) where he quotes one of the collectors in his employ as saying:

> The Vultures ought to lay early this year on account of the dry season, which seems to sometimes induce early nesting. In April of three years ago I found two nests, each containing an egg; in the following year the nests contained young at an earlier date.

The author stated further that two eggs received by him that year were laid approximately on February 24th and March 19th, respectively. The earliest date of nesting given on the Chambers list, referred to above, is February 11, 1903, and the latest, June 15, 1899. The belief that *Gymnogyps* normally nests only every second year is still held by some California naturalists, who claim that a second annual egg in the same nest indicates the loss of the previous year's young bird or the loss of the egg of that year. There is so far nothing in the literature to establish the truth of the matter one way or the other.

With the founding in 1899 of "The Condor" (begun as the Bulletin of the Cooper Ornithological Club, 1899), *Gymnogyps* may be said to have come into possession of its own "house organ," so to speak. While this publication does not of course contain the entire subsequent history of the species, it does reflect in large measure the important details thereof, and indicates the origin of others discussed elsewhere. Since every interested student surely possesses, or has access to, a complete file of this indispensable repository of ornithological lore and learning, there is little point in continuing this review beyond the year mentioned. However, when the ancient *Gymnogyps*, greatest of all flying birds of the earth, shall have passed forever from the ken of man, leaving in the lonesome vistas of its homeland mountains a dreary void no living creature can ever fill, the moment will be opportune for a more competent digest of these annals in their entirety. That time is drawing nearer year by year, and cannot be far off, when the opportunity will await some gracious and facile pen to dress this material in a meet and proper form, and add to it a fitting epitaph.

Eagle Rock, California, August 31, 1940.

SOME OBSERVATIONS ON AUTUMNAL BEHAVIOR OF THE CALIFORNIA PINE GROSBEAK

By ROBERT T. ORR

The California Pine Grosbeak (*Pinicola enucleator californica*) is of such limited and local occurrence in the state of California that it was with extreme interest and pleasure that the writer was able to devote several days to observation of their behavior in September of 1940. A number of more or less unsuccessful searches had been made for Pine Grosbeaks at various times in the Lake Tahoe region of the central Sierra Nevada in the summer or fall months in the course of the past ten years. It was not until August 27, 1938, however, that two individuals were noted, perched on top of a red fir a short distance southeast of the Velma Lakes, in Eldorado County. These birds appeared to be feeding on the terminal buds of this tree, but when an attempt was made to approach close to them they flew away.

On September 2, 1940, a flock of six Pine Grosbeaks was seen on top of a tall red fir on the eastern slope of Rubicon Peak, Eldorado County, at about the 8,500 foot level. Shortly after they were seen they flew away, only to return a few minutes later and perch in the upper parts of some red firs in the immediate vicinity. After perching on the tree tops for a few moments they dove into an adjacent extensive alder thicket where, subsequently, a two hour search failed to reveal them. Returning to this same locality on September 5, Pine Grosbeaks were again seen and several hours were devoted to studying their behavior. More observations were made on September 6 in this same region.

Eighteen Pine Grosbeaks were definitely known to be in this immediate area and it was believed at least a half dozen more were present. Their behavior made an accurate total count very difficult. The general region in which the grosbeaks were seen was in the high Canadian Life-zone. The forest cover was composed largely of red fir (*Abies magnifica*) and white pine (*Pinus monticola*), with a scattering of lodgepole pine (*Pinus contorta* var. *murrayana*) and mountain hemlock (*Tsuga mertensiana*) growing on a steep-sided mountain. The canyons which contained watercourses were, at this moderately high elevation, rather shallow and contained dense thickets of mountain alder (*Alnus tenuifolia*). Interspersed among the alders were western mountain ash (*Sorbus sitchensis*), Sierra maple (*Acer glabrum*) and several species of *Ribes*. The presence of the mountain ash was apparently an important factor, perhaps accounting for the presence of the Pine Grosbeaks. The latter fed almost exclusively on the berries of this shrub which were ripe and very numerous. The selection of mountain ash berries for food by Pine Grosbeaks has been noted by others (see Roberts, Birds of Minnesota, 2, 1932: 358; and Edson, Murrelet, 16, 1935: 14).

In coming to feed, the birds usually arrived in groups of two or three, perching on the uppermost parts of tall firs or pines near the alder patches. Call notes were given here for a few minutes; then they would move to a tree adjacent or at least very close to the portion of the thicket selected for feeding, calling again. Sometimes they would move to several trees before arriving at the margin of the thicket. When on the tops of the trees the birds appeared to be quite alert, turning about and looking in all directions. After calling and scrutinizing the immediate vicinity for several minutes, one or two would dive almost vertically downward, with the wings closed, and disappear in the brush. Sometimes they checked their descent by partly opening their wings just before reaching the tops of the bushes. The remaining bird or birds would move to the side of the tree from which the descent was made, call for several moments, then also

dive silently into the undergrowth. Often another small group would arrive within five or ten minutes and repeat the process.

Once the birds were down in the alder thicket they were usually silent. Occasionally, however, when individuals were calling in the trees near by, a similar answer would be given by an individual in the undergrowth. Likewise, one of the latter would sometimes emit a shrill, wheezy note, the significance of which was not determined. The regular call of the grosbeaks, used when they were perched on the tops of the trees or when flying, consisted of a series of three or four notes given together, somewhat remindful of the call note of the Western Tanager (*Piranga ludoviciana*), but possessing, however, more musical quality. The resemblance of the call notes of these two species has also been noted by Hunt (Condor, 23, 1921: 189). The call of the Pine Grosbeak might be phonetically described as *pr–r-r–eet*. The two middle notes are slurred and the accent is on the last note which is higher than the rest. This call is quite ventriloquial in quality. In one instance it was given by a bird that was not more than twenty-five feet from me, and yet when first heard before the individual was seen it was thought to be over one hundred yards away.

Most of the birds that were observed fed in one rather extensive thicket that was about one hundred yards in width and about two hundred and fifty yards in length. Mountain ash was fairly well distributed among the alders and, judging from the presence of discarded hulls and pulp, the birds had at various times fed in most parts of the thicket. Much of the feeding, however, was done just inside the margins. Berries growing along the outer margins as well as those growing high on bushes where they were exposed were seen to be untouched. Feeding individuals usually stayed in the lower or middle portions of bushes.

Although the birds at times appeared somewhat wild and erratic, especially when approached in the forest, they were very indifferent to human presence when feeding. It was not difficult to approach within less than twenty-five feet of feeding grosbeaks, even though the observer had to crash through brush to do so.

Feeding individuals were generally well spaced, two birds rarely feeding from the same bush. When eating, they moved about but little and were extremely quiet, often remaining on one perch for minutes at a time. One individual was seen to consume the seeds of twelve berries without moving from the same perch. The berry was seized in the bill and the seed extracted. The hull was either left on the bush or the berry was pulled entirely off and, after the mandibles crushed through to the seed, the head was given a jerk so as to cast the hull and pulp aside. The ground, vegetation and rocks about where the birds fed was generously spattered with pulp and hulls. An examination of the stomachs of seven birds collected revealed nothing but the seeds of mountain ash, no trace of hull or pulp being present. Upon tasting the berries I found them to be quite bitter and astringent.

Regarding the behavior of the grosbeaks throughout the day, it appeared that feeding was carried on to a greater extent in the late afternoon than during midday or the early afternoon. At 6:15 p.m., on the last day that observations were carried on, a group of ten was seen to fly out of the thicket in which they had been feeding. This was long after sunset. These birds had entered the thicket in small, separate groups in the late afternoon.

The flocks seen were composed of adults and young of the year. Of the seven birds collected two were adult males, one an adult female, and four were young. The adults were more than half way through their molt.

California Academy of Sciences, San Francisco, California, October 7, 1940.

OBSERVATIONS ON THE BEHAVIOR OF A YOUNG CEDAR WAXWING

By MARGARET MORSE NICE

On July 28, 1940, in Pelham, Massachusetts, I adopted a young Cedar Waxwing (*Bombycilla cedrorum*) with the intention of studying the behavior of a young bird of a markedly social species, most of my previous studies having been devoted to a non-social species, the Song Sparrow. I took only one bird in hopes that its social reactions would be transferred to me, but in this I was disappointed, for, although the waxwing remained fearless in relation to people, its social needs were satisfied by two young Song Sparrows kept in the same room.

I first became aware of the parents of my birds on June 19 when I heard what I took to be incessant begging from a baby bird; it proved to be the female waxwing begging from her mate with voice and violent wing movement. He fed her four times, but she continued to beg, crowding against him. Later I saw a waxwing take a piece of nesting material into a near-by cedar. On the 20th she was again begging for ten to fifteen minutes at a time. Later one of the birds carried material, while the other perched on a neighboring cedar. Unfortunately it was impossible to get any satisfactory view of the nest. On July 26 and 27 large young were being fed in the nest and on the 28th they left.

A number of observers have reported on the nesting of the Cedar Waxwing. It is apt to nest in groups, and we have found this to be true in an orchard at Pelham, although in 1940 this particular pair nested alone. Saunders (1911:328), records seventeen nests within a radius of 150 yards, and Gross (1929:178) three nests within 100 feet of each other. Crouch (1936:1) suggests that "nesting territory ... extends no further than a few feet from the nest itself." That the social bond is still strong is shown by Saunders' statement that "the parent birds from different nests made trips for food in small flocks, usually of four or five." At one nest a third waxwing came within eight feet, a catbird within two feet, and a chickadee to the nest itself with almost no hostile demonstration from the nesting birds (Crouch); but at another nest a waxwing and birds of other species were chased from the vicinity (Post, 1916).

Several writers state that both birds build, one bringing material, the other arranging it. Incubation lasts 14 days (Gross), and is regularly performed by the female (Crouch; Saunders; Herrick, 1935), but occasionally by both birds (Gross). Crouch gives excellent pictures of the male feeding his incubating mate; Gross says this takes place about every half hour. Brief notes are given on feather development by Saunders who found that the young were brooded at night by the female until they were 12 days old. Feeding takes place by "regurgitation," at intervals of about 20 minutes (Gross), from 15 minutes to an hour or more (Saunders). The latter author believes (p. 326) "that the method of feeding from the throat is not true regurgitation but is merely a convenient method of carrying more food at a time than could be taken in the bill...." It is not comparable to regurgitation in a goldfinch, for instance. The young leave at the age of 14 to 18 days, usually at 16 to 17, those that are fed more often leaving the earliest (Saunders).

On July 28 the four young of the Pelham nest were standing close together in a bush some 30 meters from the nest. At our approach they stood stiffly erect with feathers compressed, then flew. We caught three and found to our surprise that blueberries were at once accepted by the little birds while they were being held in our hands. Similar behavior has been reported by Maynard (1928) and by Mrs. Whittle (1928) with a bird trapped in November. I decided to keep the youngest of the brood, estimating its age from comparisons with pictures and descriptions at about 15 days.

Motor coordinations.—On the first day out of the nest the waxwing flew some three meters; five days later it flew from one end of the large room to the other, but it still had difficulty in landing, which was not fully mastered until the bird was almost four weeks old. It stretched in the typical ways—both wings up and one wing sidewise. On July 28 and 29 it also stretched both wings down at the same time, a temporary co-

ordination which I have noted in young Song Sparrows, a Cowbird, Ovenbird and European Cuckoo. It shook itself gently, never in the thorough way of the Song Sparrow. At night it slept with its bill in the scapulars, at first standing on both feet. It was not until August 14 that I noticed it balancing on one leg.

Although a vessel of water was constantly present and the Song Sparrows bathed, it was not until August 4 (about 22 days of age) that the waxwing took its first bath. Following the example of the Song Sparrows it stepped in, dipped its head and quivered its wings a few times, after which it dried itself fairly well. It never bathed as frequently nor as vigorously as did the Song Sparrows.

The birds were often in the sun, but neither "sunned" until over a month old, the Song Sparrow on August 12 (38 days), the Cedar Waxwing on August 18 (about 36 days). On the first occasion the waxwing stood with its back to the sun, its head held sidewise, its bill open. The next two days it "sunned" more thoroughly, lying down and spreading out its wings and tail.

Feeding behavior.—Rather unexpectedly this young waxwing never used any wing action when it begged, nor did it often call for food. A bird of this species, perhaps three weeks old, which Dr. Charles Walker had at the Stone Laboratory, Put-in-Bay, Ohio, waved both wings violently when begging and also called fairly constantly. Two well-grown young were begging in this demonstrative manner from a parent in Pelham in mid-August. My bird begged from the Song Sparrows by opening its bill to its widest extent and holding it directed toward them. From July 30 on, it would sometimes shake its body slightly as it begged. It did not gape to me when I offered it food, but either took the food or held its bill closed. From August 6 on, it occasionally gaped to my hand. I last recorded it gaping to the Song Sparrow on August 15 (about 33 days).

When the waxwing's gullet was filled to the brim with berries and it would take nothing more from me, its mouth would fly wide open in an apparently automatic manner if a Song Sparrow hopped up beside it. Herrick (1901: 62) states that if the young do not respond to the approach of the female, she gives a "peculiar clucking sound. . . . At this signal every mouth is opened wide, even if the gullet is already full."

As to the food given Cedar Waxwings in nature, a brood in Michigan (Post, 1916) was fed "animal food" for the first three days, but after that partly berries and partly insects until they left the nest, whereupon they were fed almost entirely fruit; in the course of an entire day two young 18 to 19 days old were fed "93 berries and cherries." A brood in New Jersey was given fruit in the nest and insects after they left it (Littlefield and Lemkau, 1928). My bird took blueberries eagerly, but at first refused insects. (Blueberries and huckleberries were extremely abundant near the nest.) Taking a hint from Mrs. Whittle's experiences (*loc. cit.*), I put small crickets and grasshoppers partly inside blueberries, and in this form they were accepted. By the afternoon of July 30 insects by themselves were readily taken. On July 29 the bird watched a ladybug; it pecked at a small insect, but did not pick up a blueberry I put before it. The next day it jumped into the berry basket and fed itself (17 days); by August 3 (21 days) it fed itself well. Miss Post's captive waxwings first fed themselves at 16 to 17 days of age.

At first my waxwing's favorite foods were blueberries and huckleberries. On July 29 it pecked vigorously at the blue band on one of the Song Sparrows, but ignored the yellow band of the other Song Sparrow. On August 1 I offered it chokecherries, which it took eagerly, but it showed no reaction to small greenish blueberries. Mrs. Whittle wrote that her bird was always attracted by "cherry-color" and Maynard (*loc. cit.*) reports a young bird's apparent attraction to a red handkerchief. On September 5 I placed an aluminum band on one leg of my bird and a red celluloid band on the other;

it worked for some time on the red band, almost completely ignoring the colorless band.

When my bird was about a month old, I noted that it would get hold of berries on branches and shake them until they came loose. On August 15 I brought in some sprigs of blueberry bushes; the waxwing (34 days old) flew directly toward me. Later in the morning I held up a sprig and the bird tried to snatch a berry in flight, succeeding in the second attempt and soon picking off three others, one by one, fluttering in front of the branch.

The waxwing's techniques with insects were much less efficient than were those of the Song Sparrows. It was always awkward in dealing with grasshoppers which I gave it; it would shake them for a bit, then usually drop them several times (I would have to pick them up) before finally swallowing them. On August 24 I put mealworms in a small cold cream jar by the birds' food and water; a Song Sparrow promptly discovered them and ate them one by one, but the waxwing did not notice the cache all morning. Six days later the waxwing came to the jar and threw out three mealworms, whereupon I came, caught them and replaced them. It returned, got a mealworm, tossed it around and swallowed it, then threw out three more.

Herrick (1901: 62) states after watching several nests of this species from a blind that "indigestible substances pass through the alimentary canal, and are never regurgitated in either young or adults." This was true of my bird, but Maynard's (1928) two young birds did regurgitate cherry pits.

The digestion of Cedar Waxwings is unusually rapid. Maynard says that he found on dissecting specimens that "the intestines were much shorter than in any other bird of like size that I had ever examined." Cherries passed through his birds in 20 minutes. I tried three tests with my waxwing; in the first case it had had no berries for several hours, although mealworms, ant eggs and "nestling food" were available; in the other tests an ample supply of blueberries had been on hand. The number of minutes from the taking of food to its excretion were as follows: August 25, blueberries, 28 minutes; August 30, chokecherries (*Prunus virginiana*), 40 minutes; September 1, wild black cherries (*Prunus serotina*), 16 and 24 minutes. Stevenson (1933) in two tests with raspberries on a young Cedar Waxwing found a much longer average period, namely 100 minutes, which was 8 minutes longer than the average time of digestion in 57 tests with 8 species of the Fringillidae. It would be of interest to test this matter with different kinds of fruits and with insects. Heinroth (1924) writes that berries pass through the Bohemian Waxwing (*Bombycilla garrula*) in a few minutes. Waxwings are often called gluttonous, but since the nutritive value of fruit is slight, it is necessary for them to take large amounts. Since the seeds and stones pass through them rapidly and unchanged, these birds must serve as important agents in the dissemination of fruit-bearing plants.

My waxwing excreted frequently during the day—3, 5 and 6 times during sample half hours, but seldom at night. From 8:30 p.m. to 6:30 a.m., August 22-23, the waxwing excreted once, a Song Sparrow 3 times; the next night the corresponding figures were 2 and 4.

Social behavior.—As social companions to this bird the following were important: Cedar Waxwings out-of-doors; people and the two Song Sparrows indoors. On July 29 a waxwing came 4 times, perching near the room and calling; the young bird answered loudly, squeezed out of its cage and tried to get to the window. From August 1 to 6 it seemed fairly indifferent to calls of its species; from the 11th to the 13th it answered with loud calls and flew against the screen. On the 18th I noted that waxwing calls might leave my bird indifferent, but on the 22nd it flew rapidly about the room. This is

the last record I have of waxwing calls, but on August 30 my bird called loudly and flew about rapidly, apparently in response to call notes of a group of migrating warblers and other birds.

Mrs. Whittle's (1928: 83) captive female Cedar Waxwing's "gregarious instincts seemed to express themselves in making the most of human companionship"; she answered when her name was spoken and (p. 85) she "had a particularly demonstrative greeting for me when I appeared each morning, or after other absence." My bird was indifferent toward people except as sources of food. Once there seemed to be some discrimination between me and a stranger, when on August 19 the bird refused to take berries from a young woman who was visiting.

The Cedar Waxwing's social reactions were directed toward the two hand-raised male Song Sparrows, T and A, some 8 and 9 days older than it. (T died suddenly on August 1.) I first installed the waxwing in a cage by itself, but it was able to get through the bars and went through the open door of the Song Sparrow cage. Here it stayed, opening its ruby gape to the widest extent whenever a Song Sparrow entered and hopped up beside it. As a rule the Song Sparrows promptly left, but sometimes they pecked inside the waxwing's mouth, whereupon the latter would try to take the Song Sparrow's bill in its own beak. Although the Song Sparrows never fed the waxwing, twice on July 31 the waxwing was able to snatch insects out of T's mouth.

On July 29 T came into the cage very quickly and hopped up beside the waxwing, who attacked him. They pecked back and forth, then T hopped to the floor and the waxwing begged from him. Waxwings are notoriously slow in their movements and T's sudden actions may have stimulated this young bird to react as to an enemy.

On August 5 while A was taking a bath, the waxwing hurried over to him, stepped into the dish, facing the opposite direction from A, and turned to beg. The waxwing took a few dips and begged once more, while A was absorbed in his ablutions. Much the same thing happened two days later. On August 15 it was plain that the two birds had a strong social bond; they lay in the sun together, preened at the same time, visited the lunch counter together, etc. The next day A was shut in the cage for an hour, and during all this time the waxwing perched on top.

On the 18th and 19th (A 46 days old, waxwing about 38) A occasionally gave a note of antagonism, whereas on the 22nd he pecked at the waxwing; yet they stayed together most of the day. On the 23rd, when the waxwing was about six weeks old, the dominance shifted, and the waxwing opened its bill at A in a mildly antagonistic way. The next day I kept track for ten minutes of the number of times each followed the lead of the other and to my surprise found that the waxwing had followed the Song Sparrow 7 times, while the opposite had happened only once. Certainly here the "despot" was not the leader. This matter of "following" probably depended both on the greater sociability of the waxwing and on the greater activity of the Song Sparrow, which was always doing something new, the waxwing following suit for company. For six nights, from August 28 through September 2, the birds went to roost side by side on a picture frame. On September 3 and 4, A was still on the frame, but W had found new perches. I do not know whether this change had anything to do with a second shift of dominance, but on September 3 when the waxwing pecked at A, the latter drove it off rather vigorously.

Fear.—The extreme attitude of alarm was not seen after the Cedar Waxwing was first taken from the wild. On August 7 it stood erect at the sound of an automobile and on the next day at the squeak of a Morris chair. It paid no attention to a mounted Barred Owl that was shown to it at intervals in August and on September 5. On August

13 a brown cocker spaniel was brought into the room; the waxwing stood erect, then flew about the room and against the screen. Nine days later when the dog was again brought in, the bird merely stood erect. On August 13 (about 31 days old) it paid no attention to A's fear note, *tik tik*. Two days later when A was in the west window and the waxwing in the east window, A gave the fear note and dropped to the floor and hid; the waxwing "froze" with a berry in its bill for almost a minute. Mrs. Whittle states that when the birds at her feeding shelf "froze," her waxwing froze too, once remaining motionless for 20 minutes, although it dropped a juniper berry from its bill after 4 minutes. On August 29, when A gave the fear note and hid, the waxwing stood erect and stiff with depressed crest.

Mrs. Whittle (1928: 82) mentions the loud "piercing danger note . . . sibilant in quality" of her bird. This I heard only four times. On August 22 (about 40 days) I noted the following: "6 a.m. W gave the alarm *seep* for the first time to my knowledge; it is very high and penetrating. 8:30. Gave it again, standing on the cage in the middle of the room. W is erect and elongated, then flies rapidly about. 11:15. W gives the alarm note, stretching out horizontally. Is on top of the mirror and possibly saw something out the window." A did not react to these notes. On August 25 I wished to catch the waxwing, but to my surprise found it difficult. It took mealworms from me, but each time before I could close my hands on it, it escaped above or below. Finally I was successful and the bird gave a high, shrill note that caused the Song Sparrow to drop to the floor and hide instantly.

Notes.—All notes heard from my bird were variations of the well-known waxwing *seeee*. This was habitually given when the bird took off in flight, except that the first few flights in the morning were usually undertaken silently. When ready to bathe, the usual note was given quickly and softly. At times, when with the Song Sparrow, the waxwing gave notes that seemed conversational in quality. The alarm note has already been described. At about 43 and 48 days the waxwing gave what seemed to be a primitive kind of whisper song, a low *zip-zip-zip-zip*, in the meantime standing on one foot. Mrs. Whittle's bird (1928: 82-83) had a "wealth" of notes: "danger," "complaining," "dinner," "bedtime," "nesting," "conversational," and, most surprising of all, "little, trilly sibilant songs of considerable variety"; during the fall and winter she "sang practically all day."

Releasing the waxwing.—On September 6 I carried the waxwing outdoors in a cage; it reacted to the new experience by making itself tall and thin. I took it out of the cage by a huckleberry patch and tried to get it to eat as it sat on my hand. It moved its tongue and mandibles, but did not take a berry. After about 4 minutes it flew with a loud *seeee* to the top of the nearest cedar. A few minutes later with an even louder *seeee* it took off in a wild flight over the trees and out of sight. We never saw it again.

Discussion.—The Cedar Waxwing is a markedly social bird throughout its life; the Song Sparrow is somewhat social during the first months of its life and in fall and winter. There was a close bond between my two young birds despite the active ways of the Song Sparrow and the deliberate ways of the waxwing. Once, on July 31, this difference led to a misunderstanding and a fight; usually it meant that the waxwing, even though dominant, followed the lead of the sparrow. It is probable that the greater sociability of the waxwing also played a role. (One of the most striking instances of this sociability is given by Feltes (1936), who states that if 2 or 3 waxwings were left in a large trap, the entire flock outside, up to 2500 or 3000 birds, would enter.)

A peculiarity of the Cedar Waxwing was its habitual use of the characteristic note whenever it took flight. This species has nothing in its plumage resembling "banner

markings"; its "flight note" is evidently an important device for keeping the flock together, and must be particularly valuable with this bird that is apt suddenly to take off on long flights.

Most young passerines, adopted after leaving the nest, will not take food immediately from a human caretaker. This the waxwing did so far as familiar food was concerned. That I did not fill the place of the "parent companion" (Lorenz, 1937) was evident from the fact that the waxwing did not gape to me nor to the forceps, but reacted to me somewhat as to a food counter. The Song Sparrows, however, more nearly approximated in size, shape, color and general behavior, what had been the parent companion, even though with two exceptions no food was procured from them. The fact that after ten days' stay the waxwing sometimes gaped to my hand might have been partly a matter of confusion at the sudden appearance of something about the size of an adult waxwing, and partly a matter of conditioning, since the bird was fed by me many times a day.

It is impossible to decide without prolonged experiment whether the attraction to blue (in this bird) and red (in this bird and two others) is inborn or learned. Several writers (Herrick, 1901; Allison, 1906) note that the assumption when alarmed of the erect, elongated, motionless attitude causes the bird to resemble a dead branch and thus must be of survival value.

SUMMARY

1. A young Cedar Waxwing that had just left the nest was kept under observation for six weeks.

2. Courtship feeding had been noted during the nest building of the parents.

3. A brief summary is given of the social nesting habits of this species as reported by other observers.

4. The young waxwing took its first bath at about 22 days of age and was first seen to "sun" itself at about 37 days.

5. The molt of the body feathers started at about six weeks.

6. Until nearly five weeks old, the bird gaped regularly to the hand-raised Song Sparrows which were about 8 days older than it, but it seldom gaped to me. It would gape to the Song Sparrows in a seemingly automatic manner after its gullet was entirely filled with berries.

7. Its technique in dealing with grasshoppers and mealworms was awkward.

8. It was attracted by blue and red objects, but ignored a yellow celluloid band and greenish, unripe berries.

9. Fruit passed through the digestive system in 16, 24, 28 and 40 minutes. This rapid and incomplete digestion makes it clear that the Bombycillidae are important disseminators of fruit-bearing plants.

10. In its relation to people this bird showed only "food-tameness." There was a strong social bond between it and the surviving Song Sparrow, the waxwing usually following the sparrow. From August 18 to 22 the Song Sparrow was dominant; after that the waxwing was dominant until September 3.

11. On August 15 the waxwing reacted to signs of fear in the Song Sparrow. On August 22 it was first heard to give the alarm note; on the 25th when it gave it loudly, the Song Sparrow reacted instantly.

12. During the daytime the Cedar Waxwing almost invariably gave its note as it took off in flight, but in the early morning the first few flights were usually silent.

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THE MORMON CRICKET AS FOOD FOR BIRDS

By IRA LA RIVERS

The list of birds which eat the Mormon cricket (*Anabrus simplex*) is sizable and these species constitute a potent natural control of the insect. The cricket, actually a long-horned grasshopper, yearly causes damage in Elko, Eureka, Lander, and Humboldt counties, Nevada, by destroying large quantities of range and field forage, crops, and garden stuffs. Parts of these northern Nevada counties, particularly northern Elko County, rival the best rangeland in the West.

Mormon crickets were first destructively active among the early settlers of the Utah of 1848, and have since been reported in several adjoining states. The Nevada records of these insects date back to 1878, when a band migrated through the mining town of Tuscarora, Elko County. Since then, there have been periodic invasions, the present one not attaining any importance until 1932. While working on the control-program in northern Nevada during the summer of 1939, I made the following observations on bird-cricket relationships.

Cathartes aura teter. Turkey Vulture. It was with considerable surprise that I came upon an individual of this species working a cricket in its cavernous bill near Whiterock. I had seen the bird from a distance in the tall sagebrush (*Artemisia tridentata*), and had worked my way up a short intervening gully expecting to find one of the larger buteos feeding on a small cricket band. The vulture was facing in the opposite direction a few yards away as I edged over the rim of the gulch, and seemed to be munching the insect in its bill. I am not sure whether the bird was actually feeding on it, or merely satisfying some innate curiosity. I startled it into flight the next instant, and the cricket was dropped.

Accipiter velox velox. Sharp-shinned Hawk. During a cold, blustery two weeks in the Diamond A country of northern Elko County, I saw what was patently the same individual of this species attacking crickets on four occasions. Twice the insects were abandoned as the bird scooted away, but in the other two instances, the bird flew away with its prize. During this cold spell, when temperatures hovered between 6°C. and 9°C. at noon, and dropped below freezing at night, crickets were to be found out over some parts of the area in all but the coldest periods. It may have been that the unseasonable weather made the normal food of the hawk scarce, and crickets became a necessity.

Buteo borealis calurus. Western Red-tailed Hawk. This hawk, the commonest of the large buteos, fed almost exclusively on Mormon crickets, especially in the regions of heaviest infestation, where insect bands sometimes spread as marching armies over several square miles. It was no uncommon sight to see a Red-tail standing sentinel-like in the brush where it had been feeding on crickets. Many small bands of crickets were first discovered because of the bird's conspicuousness among the medium-sized bushes. The species proved to be quite tame, as a general rule, for it is seldom persecuted here, and often allows a close approach before flying off. From a vantage point, after a feeding hawk had been located, it was easy to get close enough to see it walking about on the ground and picking up crickets at leisure.

Buteo swainsoni. Swainson Hawk. These birds, although less common than the foregoing, had, nevertheless, much the same habits where crickets were concerned. The species, which normally spends more time walking about on the ground than does the Red-tail, possessed one exceptional individual. While making a cricket survey at the headwaters of California Creek, east of Mountain City, I noticed this hawk behaving rather oddly. From a perch among large, granitic boulders it descended periodically to the ground below, dropping heavily and checking its fall with outspread wings, grasped a cricket and returned to the perch with it. It was then torn in two and eaten. The main band of crickets was passing several hundred yards from the hawk, but stragglers were streaming by the rocks abundantly enough to provide a meal.

Buteo lagopus s. johannis. American Rough-leg. Uncommon but fond of crickets. An amusing incident occurred while I was watching an individual consuming crickets in the brush. Driving up directly opposite the bird, some fifty yards away, I stopped to watch it. Distrustfully, the hawk returned my scrutiny, and refused to eat any more of the insects. The migrating crickets had been leaping erratically away from the hawk whenever it moved. They became quiet and again moved in an orderly stream. The motionless hawk was no longer regarded as an enemy. Through glasses,

crickets could be seen passing over the bird's claws, and soon one began to investigate the bird. This one was followed by another, and a third. Two began to climb up the hawk's tarsi. A moment later, the hawk cocked its head down at them, then pecked at his legs. This was followed by the shaking of one leg, a short skip and hop, and then the low, labored flight off over the brush.

Aquila chrysaëtos canadensis. Golden Eagle. I have never seen these common birds actually feeding on Mormon crickets, but inhabitants of the area told me that the eagle eats the insects occasionally.

Circus hudsonius. Marsh Hawk. A large female was eating Mormon crickets in a newly-mown field beside the Owyhee River, several miles south of Mountain City. A band of the insects had clustered in great numbers on the long, overhanging giant wild rye (*Elymus condensatus*) which grew thickly along the irrigating ditches, and the bird was catching them in the shorter grass bordering the ditch.

Falco columbarius bendirei. Western Pigeon Hawk. This bird, although not common, was a persistent devotee of the cricket, and failed to equal the record set by the Sparrow Hawk only because the latter far outnumbered it. The species was occasionally seen on telephone poles and fences, sometimes in company with the Sparrow Hawk, from which vantage points individuals darted down to seize crickets passing below. These they usually carried back to their perches, but occasionally ate them on the ground. On one occasion I saw a belligerent Pigeon Hawk attempt to contest possession of a cricket with a smaller Sparrow Hawk but without success.

Falco sparverius sparverius. Sparrow Hawk. This species, by far the commonest hawk in northern Nevada, is found in nearly every situation. Normally more insectivorous than the Pigeon Hawk, the Sparrow Hawk seemed to live exclusively on Mormon crickets where the insects swarmed. How it fared on such a diet, I do not know, but probably it never suffers the digestive disturbances which affect turkeys fed too extensively on the insects (and which probably bother the large buteos as well), since the falcon eats, in common with all smaller birds, only the softer body contents, and discards the hard body-shell.

An interesting incident occurred while I was surveying wasp-cricket relationships on a sagebrush ridge south of Mountain City. Several species of birds, prominent among which was the Brewer Blackbird, were seen feeding on crickets throughout the length of the ridge. A small group was working just beyond me, screened largely by a high, but straggling, stand of *Purshia tridentata*. At the sound of a commotion I looked up in time to see a Brewer shoot rapidly from between two sage bushes and fly erratically toward me with a Sparrow Hawk in close pursuit. As the blackbird darted over the tall bush which had hidden me, it saw me and veered sharply upward, dropping something from its claws. The falcon, right behind, dove for the falling object, but veered away also when it caught sight of me. The birds disappeared in different directions. The object proved to be a mutilated female cricket upon which the blackbird evidently had been feeding when startled by the falcon. From the hawk's actions, I judged the cricket had been the booty sought, but I know of one instance where a Sparrow Hawk attacked and killed a nesting blackbird which had attempted to harry the predator; but in that instance, too, my presence disrupted the tableau, and the bird flew away.

Pedioecetes phasianellus columbianus. Columbian Sharp-tailed Grouse. I have seen this species but once in northern Nevada. Cowan (U. S. Dept. Agr., Tech. Bull. No. 161, 1929:1-28) lists it as a cricket feeder.

Centrocercus urophasianus. Sage Hen. This common Nevada grouse feeds quite extensively on crickets, and groups often collect at favorable spots to feed. It is difficult to watch satisfactorily the feeding of this species which is unlike the bolder predatory hawks. The Sage Hens manage to keep well-hidden even in a minimum of brush, and become aware of an interloper long before he has located them. However, two dead birds were found with gizzards stuffed to capacity with cricket remains, and I also was able to follow a flock over rather sparsely-covered land, and to see them, with the aid of binoculars, feeding on the insects.

Phasianus colchicus torquatus. Ring-necked Pheasant. I have seen these birds, now common in the vicinity of Reno, eat grasshoppers. Pheasants have been reported as eating the Mormon cricket in Long Valley, 20 miles northwest of Reno.

Bubo virginianus occidentalis. Montana Horned Owl. I found pellets containing cricket remains beneath an occupied nest near Jarbidge.

Speotyto cunicularia hypugaea. Western Burrowing Owl. Does not, in my experience, feed extensively on the cricket, but on two occasions I caught one in the act of dismembering a cricket and several times found cricket remains about inhabited burrows.

Colaptes cafer collaris. Red-shafted Flicker. I know of one instance of this ground-loving woodpecker eating a Mormon cricket. The bird was accompanying a large flock of feeding Brewer Blackbirds, and the cricket may have first been opened and abandoned by a blackbird.

Asyndesmus lewis. Lewis Woodpecker. During the summer of 1939, when most of these observations of cricket-eating birds were made, this species was particularly abundant in northern Nevada. It seemed to have difficulty in obtaining food and invaded orchards where, in many instances, the apple crop was spoiled because the birds ate holes in the fruit. This seemed not to be an attempt to obtain codling moth larvae, but merely to taste the fruit, for a bird seldom ate a very large part of one apple before flying on to another. Scarcity of food may account for the two woodpeckers I saw feeding on the crickets, one, strangely enough, sampling the still living contents of a tin trap which contained thousands of the insects.

Tyrannus verticalis. Arkansas Kingbird. This common bird was several times seen flying to the ground from a fence or telephone pole to pounce upon a cricket. Customarily, the bird then returned to its perch with the victim and dismembered it much after the manner of the Brewer Blackbird.

Empidonax difficilis difficilis. Western Flycatcher. An *Empidonax*, apparently of this species, was the source of an amusing episode south of Mountain City. I watched a bout between the small bird and a large, female cricket, in which neither contestant could claim the honors. I heard a few brisk, shrill notes in a small clearing off to my left and as I turned to see what was up, I saw plainly that the hitherto steady, uninterrupted stream of migrating crickets had been disturbed. Frightened insects were leaping erratically in all directions away from the source of the disturbance. Moving to bring the clearing into fuller view, I was surprised to see the bird clutching a large, blackish female cricket by the hard thoracic shield and trying in vain to subdue the intended victim, meanwhile balancing precariously on the free foot. But the cricket kept jumping and hopping, her long and powerful hind legs again and again upsetting the determined bird which each time managed to struggle to its feet and hop upright for a moment before being tumbled about again. It was obvious that the bird was no match for the cricket, not only because of the attacker's lightness, but because the flycatcher was holding the insect by a thickly-armored segment and could do it no possible harm. The climax came soon. Once more the cricket threw the bird off balance, then grasped the bird's free leg with her forelegs, probably merely as support. However, this ended the matter, and the bird loosed its hold and darted off through the brush, while the cricket leaped frantically for cover. The insect possesses powerful jaws and these seemed to have been in a position to persuade the bird that the situation had gotten out of hand.

Otocoris alpestris. Horned Lark. Larks were everywhere assiduous feeders on the crickets, and were adept at incapacitating and eviscerating the large insects. These birds generally pulled the head off the insect and fed entirely upon the digestive and reproductive tracts which came with it.

Pica pica hudsonia. American Magpie. This avid consumer of the insects, more than any other bird, seemed to prefer the contents of tin traps. These traps catch crickets by the thousands, and these become, in a few hours, a nauseating decomposing mass. The first crickets to enter the trap are smothered by the hundreds pouring in on top of them and the boiling sun shortly kills the remainder. Fly larvae may be found in the bottom layers of crickets on the following day. It is from such rank and fetid traps that I have seen many magpies placidly feeding. Magpies of course pick up crickets wherever and whenever encountered, but probably prefer to get them from the traps because of the convenience.

Corvus brachyrhynchos hesperis. Western Crow. Not common in northern Nevada. This species fed readily on Mormon crickets, once in company with magpies, another time close to a foraging Red-tail.

Cyanocephalus cyanocephalus. Piñon Jay. These birds, characteristic inhabitants of the juniper-piñon belt throughout Nevada, commonly eat crickets.

Oreoscoptes montanus. Sage Thrasher. This is one of the three species which fed most destructively on the insects. Eggs as well as adults were consumed. From my observations, the thrasher played nearly as important a role in the destruction of cricket egg-beds as did the more conspicuous Western Meadowlark, but, because of its relative shyness, drab plumage, and general inconspicuousness, such work was not as readily appreciated as that of the meadowlark or as that of the destruction of adults accomplished by the noisy, bluff Brewer Blackbird. South of Mountain City, where the most intensive observations were carried on, I found the Sage Thrasher feeding not only on the migrating crickets, in company with grasshopper mice (*Onychomys leucogaster brevicaudus*) and shrews (*Sorex vagrans amoenus*), but also digging up crickets from partly-finished wasp burrows. One individual was surprised in the act of eating a black wasp (*Chlorion laeviventris*) which had been left by a marauding shrew.

Turdus migratorius propinquus. Western Robin. These birds often congregate in small flocks to feed persistently upon the Mormon cricket.

Anthus spinoletta rubescens. American Pipit. I know of one instance in which this species ate a cricket. In the Bull Run Mountains, southwest of Mountain City, I came upon a pipit just finishing

a female cricket. The insect had been opened along the dorsum, and the contents, including eggs, were missing. Apparently most of the smaller birds confine their attacks to the females (see account of Brewer Blackbird).

Lanius ludovicianus nevadensis. Nevada Loggerhead Shrike. This bird was an avid consumer of the Mormon cricket, and perhaps one of the best controls of the adult pest. Willow thickets in regions of heavy infestation were used as storehouses for the excess catch, and the dried and shriveled remains of crickets impaled on stiff twigs and forgotten was visual record of the bird's assiduous labor. Barbed-wire fences were used in other sections of the area.

Passer domesticus. House Sparrow. These small, hardy settlers probably never attack full-grown crickets, at least, not in my experience, but on one occasion I noted a small flock of them feeding on half-grown crickets, members of a band passing the outskirts of Elko.

Sturnella neglecta. Western Meadowlark. This species is by far the ablest avian predator of the Mormon cricket, for it specializes upon the eggs of the pest. Meadowlarks have been reported at various times as destroying entire, vast cricket egg-beds, and I have, on many occasions, seen them hard at work in such egg-beds, digging industriously for the palatable eggs, which are generally laid in clusters of from a few to over fifty. When it is appreciated that such egg-beds may be several square miles in extent, and that, in the first few years, at least, of the cricket swarms, insect egg parasitism is practically of no importance in holding the cricket in check, this wholesale destruction of the eggs becomes increasingly important in any human scheme to control the insect.

Because each egg will develop, normally, into a cricket, and because a bird can consume up to two hundred eggs at a time, but only, at the most, 8 or 10 adults, egg predators are generally more efficient against a species than animals which eat only adults. Western Meadowlarks are seen occasionally with adult crickets in their bills, and at certain times they appear to feed extensively on the adults, but this is not the general rule.

Xanthocephalus xanthocephalus. Yellow-headed Blackbird. This bird, known locally as "White-wing," is anomalous. I saw but one individual of this species, and it was feeding on a Mormon cricket. The incident occurred along the highway several miles south of Mountain City, a short distance from the Owyhee River. A band of crickets had been severely dusted at the northern edge of a field which they had been about to enter and had been brought up short at a marginal ditch into which oil was running as a secondary line of defense. Poisoned crickets lay thickly on the ground along the ditch, most of them killed by direct contact with the insecticidal dust, the remaining ones secondarily killed by eating the carcasses of their more strongly-poisoned fellows. Along this ditch bank, which harbored thick willow clumps on the opposite side, I came upon the solitary "White-wing" early the following morning, feeding on a cricket. The bird flew off as I came up, and, upon inspection, the insect appeared to have been dead for some time. It was not yet stiff, but was no longer limp. The head had been pulled off, and some of the body contents eaten. I adjudged the insect to have been one of those secondarily poisoned from eating other poisoned crickets, and, since I failed to see the bird again, have wondered about the effect the small amount of arsenic might have had.

Agelaius phoeniceus nevadensis. Nevada Red-wing. Although these birds were seen occasionally on the more marshy, moist bottomlands, such habitats were not widely distributed in the area. Consequently the Red-wing was not common. I have but one record of its attacking a cricket. In this instance the insect was handled in the same way as by the Brewer Blackbird.

Euphagus cyanocephalus. Brewer Blackbird. This bird, in company with the Sage Thrasher and Western Meadowlark, is one of the destructive "Big Three" of the northern Nevada cricket fields. It has been known to destroy entire bands of adult crickets, but has never been reported as working on the egg-beds. It can safely be said that each of these three species of birds is responsible for more destruction of the Mormon cricket than all the other species together.

The Brewer's assault upon the cricket is confined entirely to the females, which the birds covet for their eggs. These they take by splitting the dorsum of the abdomen transversely along the soft membranous tissue between the sclerites, a feat accomplished by grasping one end of the body in the bill, the other in a claw, and tugging; some go to less trouble and merely tear the head off, pulling with it the entire abdominal, and much of the thoracic, contents, which are all consumed. An unexplained habit of these birds is their snipping off of the female cricket's ovipositor, something they quite frequently do.

However, while blackbirds feed extensively on the crickets in lean areas, they may almost ignore them adjacent to fields where they can obtain abundant seed. In one region south of Whiterock I observed a band of approximately 200 blackbirds working on a hillside which bore a cricket population of five per square foot. After an hour's observation I investigated their work and found, at the spot, only one attacked cricket to the square yard. Females constituted fifty per cent of the cricket population, and, on this basis, the kill ratio amounted to 1 out of 22.5, a very low figure.

Molothrus ater artemisiae. Nevada Cowbird. I did not find this species commonly in northern Nevada, but occasionally it mingled with the ubiquitous Brewer Blackbird, feeding upon the crickets.

Carpodacus mexicanus. House Finch. At Primeaux I found a nesting bird bringing quarter-grown Mormon crickets to her nestlings.

Oberholseria chlorura. Green-tailed Towhee. *Pipilo maculatus curtatus*. Nevada Towhee. These two species of towhees were found feeding on the small, third-instar crickets in the Bull Run Mountains, southwest of Mountain City.

Chondestes grammacus strigatus. Western Lark Sparrow. This bird was found in the higher foothills of the Jarbidge, Bull Run, and Jack Creek ranges, and, like the two preceding species, was seen to feed only on the small, immature crickets.

Passerella iliaca schistacea. Slate-colored Fox Sparrow. A high montane species, which I observed once feeding on immature crickets only a few days old.

Zoological Laboratories, University of Nevada, Reno, Nevada, October 5, 1940.

FROM FIELD AND STUDY

Water Ouzel Raises Brood under Difficulties.—Late in April, 1940, the nest of a Water Ouzel (*Cinclus mexicanus*) was noted in the process of construction a short distance above the surface of the Merced River on a small ledge on one of the piers of Sentinel Bridge in Yosemite Valley, California. The location of this nest was peculiar in that it was on a section of the Merced River which is deep and very calm. When the nest was first noticed, several of the observers in the valley remarked on the possibility that it might be washed off the pier in the period of high water which was sure to come when the snows began to melt.

In May, when the Merced River began rising every evening, I went to see how the nest was faring and at 9:30 p.m. on May 10 found that it was completely covered by the river. On May 13, also at 9:30 p.m., the nest was about half covered by the water. As the highest point of the water usually occurs about 11:00 p.m., it seems probable that the nest was completely covered by the water after I had left on May 13. Despite these two soakings, and there probably were more, the female ouzel managed to brood the eggs successfully and the four young birds were seen by several people on the day that they left the nest. Presumably there was an air pocket in or about the nest during periods of submergence.—VINCENT MOWBRAY, *Oakland, California, October 31, 1940.*

Extension of the Known Range of the Flammulated Screech Owl in California.—On the night of July 8 and the morning of July 9, 1940, Mr. Joe T. Marshall, Jr., and I climbed over the northeast slope of Mount Hanna, Lake County, California, looking for Flammulated Screech Owls (*Otus flammeolus*). As a consequence of Mr. Marshall's excellent vocal efforts, two of these elusive little owls were enticed close enough to be seen with the aid of a flash light. One of these two individuals, an adult male, was taken, and is now number 79271 in the Museum of Vertebrate Zoology. The reaction of these owls to an imitation of their note would indicate that they were on their breeding grounds. This is apparently the first record of this species in the west-central part of the state. —NED W. STONE, *Berkeley, California, November 11, 1940.*

Water-Thrush at Zion National Park, Utah.—On September 22, 1940, a Water-Thrush (*Seiurus noveboracensis*) was observed along the Virgin River near the Narrows in Zion Canyon, Utah. For almost a week this bird was watched daily by hiking parties going up the Narrows Trail and was a source of great interest. This constitutes the third record of this species from southern Utah, and the first from Zion National Park.—RUSSELL K. GRATER, *Zion National Park, Utah, October 28, 1940.*

Notes on the Feeding Habits of Two Species of Hawks.—In the late afternoon of July 21, 1938, two Pigeon Hawks (*Falco columbarius*), probably a mated pair, were seen on the edge of a pond-like embayment on the shore of Quesnel Lake, British Columbia. They were very dark in color and heavily marked ventrally, suggesting the subspecies *suckleyi*. The birds were apparently hunting insects, as they would fly out rather leisurely, flutter, and return to perch. Twice after doing this one of them was observed to go through all the motions of eating something. The whole performance was very much like that of the "hawking" habits of many fly-catching birds.

Several times one or the other of the birds would pass over the embayment, causing a violent splashing of fish, which evidently feared an attack. Most probably the fish were not in danger from the Pigeon Hawks, but were unable to distinguish between them and the Ospreys which also hunted this water.

Although we camped by this pond for five days, Pigeon Hawks were seen only on the one afternoon. Possibly they had been driven from their normal hunting grounds by a forest fire then burning in near-by mountains.

An Osprey (*Pandion haliaëtus*) spent most of the morning of July 23 at the small embayment mentioned above. Sometimes it would fly about calling, but it spent most of the morning watching the water. After some time we heard a splash and saw the Osprey leave the water and fly off with an eight-inch fish of a kind locally known as "squaw fish" and not considered as game. The hawk returned in the afternoon and perched in a high tree, thirty feet off the ground. It appeared to watch a particular part of the pound intently, often moving its head backward and forward as though for a better view. Once it launched itself but did not strike, returning to its perch. Finally after going through the usual "seeing motions," it adjusted its position and suddenly dropped to the water, going under until only its back showed. Instantly, it was in the air again, carrying a "squaw fish" in each foot. After flying a little way the bird dropped one of the fish, but made no effort to retrieve it.

Instead, it adjusted the other to the characteristic head-first "carry," flew to a dead tree and, after looking all about, began its meal.—JOHN E. CUSHING, JR., *California Institute of Technology, Pasadena, California, October 9, 1940.*

Waterfowl Breeding Records from San Bernardino and Riverside Counties, California.—*Butorides virescens anthonyi.* Anthony Green Heron. Although the Anthony Green Heron has been recorded as breeding in a number of places in southern California, it may be worthwhile to record two more regular breeding stations. Green herons have bred commonly at Lake Elsinore, Riverside County, for at least the last three years. On June 20, 1938, a nest with five eggs and another with three eggs were found. On July 6, 1939, a nest with five young was found, three of which were banded (nos. 39-522905—39-522907). On June 13, 1940, two nests were located. One nest held four half-grown young which were banded (nos. 39-522922—39-522925); the other nest we were unable to reach. There were undoubtedly some nests each year which we did not find.

A nest with five small young was found at a pond about ten miles from Redlands on June 3, 1938. Four of the young ones were subsequently banded (nos. 37-502918—37-502921) on June 11. The birds have been present at this same place during the summers of 1939 and 1940, but no effort was made to find the nest.

Botaurus lentiginosus. American Bittern. This species was seen twice near Chino, San Bernardino County, on June 16, 1940. It is probable that the birds were breeding, as Mr. Charles Bradford of Pomona, who showed me the birds, has in his collection a set of three American Bittern eggs which he collected at this place on April 14, 1934. This species has been recorded previously as breeding in southern California at three places near the coast (Willett, Pac. Coast Avif. No. 21, 1933:24).

Ixobrychus exilis hesperis. Western Least Bittern. Has been observed during the summers since 1935 at a group of small tule-bordered ponds near Redlands. As many as five individuals have been seen at one time. While the birds' actions at times indicated that they were breeding, no definite proof was obtained until 1940. Two young birds out of the nest, but unable to fly and with juvenal down still on their heads, were captured and banded (nos. 40-413153 and 40-413154) on June 24. On July 5 Herbert Hill found a nest with four eggs. No bird was on the eggs when they were discovered but a Least Bittern was seen to return to the nest.

Mr. Charles Bradford collected a set of four least bittern eggs in a marsh near Chino April 16, 1931. This set (no. 4947) is now in the collection of Mr. Wilson C. Hanna. The birds are still present in this marsh, as one was seen here July 17, 1940, by Herbert Hill.

Although the species is recorded in Willett's distributional list (*loc. cit.*) as a fairly common summer resident, only two nesting localities are given: Nigger Slough, Los Angeles County, and San Jacinto Lake, Riverside County. Neither of these marshes still remain.

Charadrius nivosus nivosus. Western Snowy Plover. Three eggs were found in a slight depression in the sand at Lake Elsinore on July 6, 1939. The birds nested here again in the summer of 1940, one downy young and the parents being found on June 13. There are a few inland breeding records for this species, as for example at Salton Sea.

Recurvirostra americana. Avocet. A pair of Avocets was seen on July 6, 1937, and several were seen July 6, 1939, at Lake Elsinore, but the birds were apparently not breeding, being indifferent to our presence. However, on June 13, 1940, three pairs were found which became very excited at our approach. We were able to locate two eggs in small hollows on the bare sand, each probably the first of a clutch.

The heavy rains in the spring of 1937 flooded much of the old San Jacinto Lake bed, Riverside County, and on July 4 there still remained in one place a body of water about three-fourths of a mile long. Here there were thirty or forty Avocets which gave every indication that they were nesting. One bird repeatedly dove at us and many of them were much disturbed by our presence. We actually found no nests, the deep mud and intense heat making it almost impossible to reach the small sand bars in the center of the pond. The birds, however, could not have had a successful breeding season, as we found the pond completely dry and all the birds gone when we returned on August 8. The only other recent breeding records for Avocets in southern California are from Del Rey, Los Angeles County (Willett, *op. cit.*, p. 68).

Himantopus mexicanus. Black-necked Stilt. In the spring of 1937 Lake Elsinore greatly increased in size, creating conditions which were apparently very attractive to stilts. On July 6 of that year we found about forty birds breeding there. We located only eight nests with eggs, but two nests held only one egg and there were several nests still empty, indicating that the birds had not all laid. We probably also failed to find some nests. On August 8 we returned and were able to capture and band five nearly-grown young stilts (nos. 295131 and 295133—295136) and we found one nest still with

eggs. This unusually late set of four eggs was collected by Mr. Wilson C. Hanna and is now in his collection (no. 5939). On July 6, 1939, two nests were found, and on June 13, 1940, one nest was found and two or three pair of birds were seen. There is one previously published record of stilts breeding at Lake Elsinore. Florence Merriam Bailey records finding three pairs and three half-grown young on July 26, 1907 (Condor, 19, 1917:157).

Ten or fifteen stilts were observed at San Jacinto Lake, July 4, 1937, with the Avocets and their actions indicated that they were also breeding here.—HAROLD M. HILL, *Redlands, California, September 17, 1940.*

The Buccal Food-carrying Pouches of the Rosy Finch.—Carrying of food in quantity by adult birds engaged in feeding their young ordinarily is facilitated by a crop, by expansion of the undifferentiated oesophagus, or by simple distention of the floor of the mouth. A special food-carrying device in the Rosy Finch (*Leucosticte tephrocotis*) appears to be highly unusual, if not unique, among birds, and to my knowledge it has not been figured before. The only author whom I have found mentioning it is A. K. Fisher (N. Amer. Fauna, 7, 1893:82). He reported E. W. Nelson's observations on breeding leucostictes in the White Mountains of California as follows: "He noticed when skinning the birds that they had a double craw. One located in the usual place [presumably a distended oesophagus] and the other in the form of a double gular sac divided by a median constriction. The latter when full hangs down like a lobe of bare skin outside of the feathers."

Knowledge of this observation led me to look for sacs in breeding leucostictes taken in the Wallowa Mountains of Oregon in 1938. Although one female possessed sacs, the mouth region was not in a condition that would permit exact determination of the plan of the structures. A female *Leucosticte tephrocotis littoralis* (Mus. Vert. Zool. no. 76205), taken on Mount Shasta, California, on July 15, 1939, provided the opportunity to dissect the gular sacs carefully. The accompanying figure is based on notes and measurements made of this individual.

The two sacs are well formed chambers, with definite openings connecting to the buccal cavity, and are not merely fissures or open pockets in the mouth lining. There is an opening on either side of the tongue and glottis in about the region of the median mandibular gland (see Anthony, Zool. Jahrb., Abt. für Anat., 41, 1920:573, fig. H a). These lead downward, each to its own sac which is lined with moist buccal epithelium. The two sacs are loosely joined anteriorly by connective tissue in the median plane but there is no communicating passage between as might be inferred from Nelson's account. Each sac extends backward and laterally between the external integument and the floor of the mouth. When fully distended, it presses against the infra-auditory region of the skull and the posterior part of the ceratobranchial bone. The distended pouches measured from orifice to posterior end about 1½ cm. and were ½ cm. in diameter. The sacs resembled the cheek pouches of kangaroo rats when they were first encountered in skinning over the bird's neck and head.

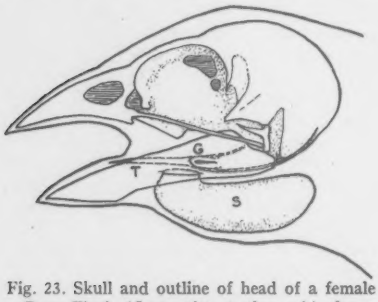

Fig. 23. Skull and outline of head of a female Rosy Finch (*Leucosticte tephrocotis*) showing gular sac (S) of left side with opening in floor of mouth lateral to tongue (T) and glottis (G). The tongue apparatus is shown in broken lines, in its position behind (medial) to ramus of lower jaw.

Nelson's statement that the sacs hang down as a lobe of bare skin outside the feathers is misleading. There could at times be distention coupled with loss of feathers such that the skin of the throat might be visible, but the sacs could not themselves protrude externally. A bird with filled sacs does show a bulging throat and the feathers may stand erect as a result.

The gular sacs that I have examined have been packed full with insects; there may have been small amounts of other types of food that were unnoticed. Obviously, the food was being carried to young birds. Only females with brood patches and ovaries in post-laying condition have thus far been found with gular pouches. I do not know that males develop them although I think they may.

In surveying the breeding habits of leucostictes, the adaptive value of this special device for carrying large quantities of food becomes apparent. The nests which are always placed in alpine cliffs or rock slides often are far from feeding places. A concentrated supply of food at a distance may be utilized without expending time and energy in numerous long trips to and from the nest. Howard

Twining's observations (MS) at the nests of Sierra Nevada Rosy Finches (*L. t. dawsoni*) show how the feeding routine is adjusted in relation to carrying ability. He found that throughout the day each parent comes to the nest on the average of once every 45 minutes during the period of greatest growth of the young. This is a long interval between feedings for young passerine birds that are supplied insects primarily (compare the Song Sparrow; Nice, Trans. Linn. Soc. New York, 4, 1937:130). Concomitantly, the food delivered to young leucosticte at one feeding is great and the situation is remindful of the copious feeding at a single visit of young of species where the nestling food consists of vegetable material held for a time in the crop or oesophagus of the adult. Twining noted that as many as twenty-five deliveries of food to the group of young might be made by a leucosticte on one visit to the nest.

The question may be raised whether the gular sacs are any better suited than an enlargement of the oesophagus would be for carrying insects to the young. It is possible that they are not. Leucosticte may have evolved the sacs correlative with a tendency to crowd large numbers of insects into the mouth. It probably is instinctive in rosy finches to hold most of the insects intended for the young in the mouth rather than to pass them down the gullet. This seems generally to be the case in passerine birds which I have observed. In the presence of such an instinct a gular sac might more readily evolve through selection than would a true crop, provided the necessary mutations occurred.

In the matter of the relation of the genus *Leucosticte* to other snow finches of the Old World, particularly *Montifringilla*, Sushkin (Bull. Brit. Orn. Club, 45, 1924:36-39) has shown that important differences exist in the palatal structure which argue for the inclusion of *Montifringilla* with the weaver-finches (Ploceidae) and retention of the leucosticte with the true finches. Mayr's demonstration (Jour. für Orn., 75, 1927:596-601) of differences in the completeness of the postjuvenal molt further emphasizes the distinctness of these two groups of snow finches. Had Sushkin known of the peculiar gular pouches of *Leucosticte*, it seems unlikely that he would have failed to use this anatomical evidence one way or another in working out the relationships of these genera. Considerable interest attends, therefore, the result of search for gular sacs in other alpine finches supposedly related to *Leucosticte*. In fact much of importance remains to be learned about the situation in the rosy finches themselves with regard to seasonal occurrence of the sacs, their histology, and their presence in the male.—Alden H. Miller, *Museum of Vertebrate Zoology, Berkeley, California, December 15, 1940.*

Colorado Nesting Records.—On June 3, 1940, we found nests of Western Grebes (*Aechmophorus occidentalis*) and White-faced Glossy Ibis (*Plegadis guarauna*) on Trites Lake, Saguache County, Colorado. Sclater (Hist. Birds Colorado, 1912, p. 77) reported that Aiken had found the glossy ibis nesting on San Luis Lakes on July 1, 1875, but gave no authority for the statement, and we have failed to find anything in the literature regarding Aiken's observation. W. W. Cooke had access to Aiken's notes and he states specifically (The Birds of Colorado, 1897, p. 60) that he did not know of nests of this species having been taken in Colorado. San Luis Lakes are in a dry alkaline area and are not bordered with aquatic vegetation necessary for such birds at the present time. Judging from the appearance of the country, we doubt that conditions in the past seventy-five years would have been favorable.

If Aiken actually found nests, it was probably on some of the smaller ponds of San Luis Valley. There are many early records for the ibis from the valley, but it has only been in recent years, comparatively, that conditions have been favorable for nesting water birds.

This broad valley has long been known for its fertility, wherever water was available for agricultural purposes. Flowing wells dot the landscape in many sections, forming ponds in an otherwise arid country; these have become bordered with marsh growths. The entire region reminds us of the area surrounding Great Salt Lake, with extensive alkali flats grown with spiny shrub (*Coleogyne ramossima*) and rabbit-brush (*Chrysothamnus pateus*).

Trites Lake is the property of the Saguache Gun Club, a few miles south of the village of Saguache. The lake has the finest nesting cover we have seen in Colorado. The western edge is grown with a thick tangle of cattails and tules in which we found many nests of Cinnamon Teal (*Querquedula cyanoptera*) and Mallards (*Anas platyrhynchos platyrhynchos*). Nowhere have we found the Western Marsh Wren (*Telmatodytes palustris plesius*) so common. Literally hundreds of males were heard singing, and dozens of nests, many with eggs, were found. With the wren so common in this place, it seems strange that no nests have been found along the many fine marshes of eastern Colorado or in any other section outside the San Luis Valley.

The Western Grebe was a common form on the lake. Fifteen or twenty birds were observed when we first reached the shores, and after a casual investigation, we found nine nests with eggs ranging from three to seven in number. Nesting had been going on for some time, for several sets were badly incubated.

The ibis were nesting in a colony with about one hundred and fifty Brewster Egrets (*Egretta thula brewsteri*) and possibly one hundred Black-crowned Night Herons (*Nycticorax nycticorax hoactli*); many nests of both the egrets and night herons were found, containing eggs, or small or large young. The only nests of the Brewster Egret in Colorado of which we know prior to this time were those recorded from Barr Lake (Bailey and Niedrach, Condor, 40, 1938:44-45).—ALFRED M. BAILEY and FRED G. BRANDENBURG, *Colorado Museum of Natural History, Denver, Colorado, August 14, 1940.*

A Note on the Food of the Western Burrowing Owl.—The literature on the food habits of the Western Burrowing Owl (*Speotyto cunicularia hypugaea*) has been well summarized by Bent (U. S. Nat. Mus. Bull. 170, pt. 2, 1938:389-390). On a recent trip to Colorado I made some observations which add to our knowledge of the diet of this owl.

Within the city limits of Denver, and close to the new army airport, is a sizable colony of prairie dogs. Within this colony at least two pairs of Burrowing Owls were utilizing the deserted burrows of the prairie dogs. On June 25, 26, 27, 1940, I visited this colony and collected several hatfuls of the pellets and refuse from the nesting sites of these owls. At that time the young owls, numbering 7 and 8 in the two broods, were well developed but could not yet fly. They would cluster about the mound at the entrance to the burrow, watching eagerly for the parents, both of which engaged in the feeding activities. About the mound lay quantities of crayfish, feathers, insect fragments and other detritus, and the mounds could be recognized at some distance by the white splashes of excrement.

Crayfish were the most conspicuous and bulky food items about the dens. The nearest source of this food was well over a mile distant, and it is probable that the owls flew considerably farther in order to secure such food. A list of the determined food items follows:

Crustaceans: Numerous fragments of *Cambarus* sp.

Insects: Spiny-legged camel cricket (Rhaphiodophorinae), many fragments; *Calosoma*, numerous; *Pasimachus*, very numerous; *Harpalina*, very numerous; 7 other carabids, several scarabaeids, a few tenebrionids and weevils, several cydnids, 3 caterpillars and 2 hymenopterans.

Amphibian: Leg bone of *Rana*.

Birds: Numerous feathers of the Western Kingbird, *Tyrannus verticalis*.

Mammals: Several jaw bones and fur of *Microtus*; bones of *Cynomys*. The latter were probably not killed by the owls, but rather were individuals which had died in the burrows and had subsequently been removed by the birds.

I am indebted to Charles C. Sperry of the Fish and Wildlife Service, Denver, who made the majority of the determinations.—W. J. HAMILTON, JR., *Cornell University, Ithaca, New York, November 5, 1940.*

A New Race of Bush-tit from Southeastern California.—Previously it has been shown by van Rossem (Auk, 53, 1936:85-86) that the bush-tits from the southeastern corner of California were distinct from others in the Great Basin region. It was suggested by him that birds from the Providence Mountains of southern California and other ranges in the vicinity represented a northwestward extension of the range of the race *Psaltriparus minimus cecaumenorum* from central Sonora, Mexico. The similarity in the birds was supposedly in their coloration. Examination of the type series of *cecaumenorum*, kindly loaned to me for study by the Museum of Comparative Zoology through Mr. James L. Peters, shows that the birds are either juveniles or adults in very worn plumage, and that they are undoubtedly not representative of the true colors occurring in the population.

Upon comparison of a series of 44 adult birds taken in the Providence Mountains, the type series of *cecaumenorum*, and representative birds taken from the range of *P. m. plumbeus*, it was readily seen that we were dealing with three distinct races. Accordingly, there follows a description of a new race, *providentialis*.

Psaltriparus minimus providentialis, new subspecies.

Type.—Adult female no. 72812 Mus. Vert. Zool.; collected 5 miles NE Granite Well, 5400 feet, Providence Mountains, San Bernardino County, California, December 28, 1938, by J. T. Marshall, Jr.; orig. no. 231.

Subspecific characters.—Pileum concolor with dorsum, whole back being olivaceous; flanks without the conspicuous vinaceous seen in *plumbeus*, hence more uniformly buffy; throat and belly usually concolor, instead of throat lighter as in *plumbeus*; auriculars generally browner than in *plumbeus*; dimensions greater than in any other race.

Measurements of type.—Wing, 51.8 mm.; tail, 60.7; bill length from nostril, 6.3.

Range.—Providence Mountains of southeastern California and Charleston Mountains of southern Nevada; in less extreme form in White and Inyo mountains of California.

Remarks.—The differences in coloration between this new form and *plumbeus* have already been noted by van Rossem (*op. cit.*). To review these characters, *plumbeus* possesses an olivaceous back which contrasts with the ashy gray pileum, whereas in *providentialis* the dorsum and pileum are concolor. The vinaceous wash seen on the flanks of *plumbeus* is, in fresh-plumaged birds, not seen in *providentialis* to any great extent. Two characters not previously noted are the lighter throat in *plumbeus* and the darker auricular feathers in *providentialis*.

In comparison with *cecaumenorum*, *providentialis* is a larger bird in all measurable characters. The true coloration of *cecaumenorum* is subject to doubt, as no winter-taken individuals are available. The head and auriculars of the topotypes of *cecaumenorum*, even though worn, seem too light to be equivalent to *providentialis*.

The following are the average measurements (in millimeters) of the three races of bush-tits in question. Males and females are combined, as no significant differences in the averages of the sexes has been found.

	Number	Wing	Tail	Bill length from nostril
plumbeus	42	50.3σ1.01	56.5σ2.78	6.12σ .24
cecaumenorum	9	48.9σ1.30	54.7σ1.32	5.90σ .28
providentialis	44	51.3σ1.42	59.0σ2.28	6.43σ .24

In a series of skins from Inyo and Mono counties, California, contained in the Museum of Vertebrate Zoology, coloration on the back is similar to *providentialis* and the flanks lack the vinaceous wash; but the throat is lighter than the belly and in this they are similar to *plumbeus*. The auriculars are intermediate between the two forms. On the whole, however, these birds are closer to the new form than they are to *plumbeus*. The birds from the Charleston Mountains are similar to those of the Providence Mountains (see van Rossem, *op. cit.*)—M. Dale Arvey, *Boise Junior College, Boise, Idaho, November 29, 1940.*

Unusual Behavior of the Florida Gallinule.—At Lindo Lake, Lakeside, San Diego County, California, I was fortunate in observing some peculiar actions of the Florida Gallinule (*Gallinula chloropus*). On April 6, 1940, one was noticed paddling among the tules. It was frightened and hid in the thick growth, when I tried to show it to my companion. Soon after we moved away it showed itself on the other side of the narrow neck of water.

A Dr. Beale and his party from San Diego arrived and we searched the area for the bird, without locating it. When we returned to the car, the gallinule appeared on the shore and, as we watched, proceeded to climb a willow tree to a height of about twenty feet. The wings were used only slightly to assist in balancing as the bird walked up the sloping trunk. The gallinule stayed on the trunk or large branches. Another bird came out of the tules and followed the first up the tree. Both gallinules remained in the tree about five minutes, apparently feeding on the willow catkins. An effort was made to photograph them, but the tree was too dense. One bird flew down into the reeds, and the other was flushed by throwing a stick. Both hid again and were seen no more. No notes were heard during the entire episode.—James G. Peterson, *Descanso, California, November 1, 1940.*

The Columbian Sharp-tailed Grouse in Lake County, Oregon.—Gabrielson and Jewett (Birds of Oregon, 1940, pp. 216-217) mention the Columbian Sharp-tailed Grouse (*Pedioecetes phasianellus columbianus*) as now being scarce and apparently in danger of early extinction in Oregon. Since Jewett does not record it from the Hart Mountain Antelope Refuge (U. S. D. A. Misc. Publ. no. 355, 1939) as late as 1939, the following note may be worthwhile.

While with a paleontological field party from the California Institute of Technology in 1940, the author spent several days at Beatty Butte, Lake County, Oregon. Here, on July 29, a band of four Sharp-tailed Grouse was flushed on the western side of the Butte, high up among dry lava rocks and grasses. The birds were seen in the evening, just before sunset. In flight they moved more rapidly and were noticeably smaller than Sage Hens, which were numerous in this region. Uttering sharp cries, they passed up and over the brow of a small hill, to rise again and disappear at our approach.—John E. Cushing, Jr., *California Institute of Technology, Pasadena, California, October 9, 1940.*

Creepers and Sequoias.—I was much interested by the Rankins' recent paper (British Birds, 34, 1940:56-60) on the roosting habits of the Tree Creeper (*Certhia familiaris britannica*) in sequoias introduced to Great Britain. Of 17 *Sequoia gigantea* and 12 *S. sempervirens* under observation, 12 and 4 held creeper roosting holes, totalling 139 and 6 in number, respectively. Kennedy (British Birds, 30, 1936:2-13) also discusses this matter and on page 2 advises that some of the trees were probably

planted as early as 1853. The older trees have thick, fissured bark and are favored by creepers for roosting over the younger ones with less furrowed bark.

Presumably none of these trees developed thick enough bark to provide attractive roosting sites until about 40 years ago. Hence, since that time creepers have come to use them freely. This indicates that an inherent relationship exists between the bird and tree species and also shows the rapidity with which the bird species may take advantage of a favorable addition to its habitat. We in California well know the close relationship that exists between our races of *Certhia familiaris* and the two sequoias, also with the incense cedar (*Libocedrus decurrens*) which has similar bark. Yet this relationship is in no wise critical to creepers, for they are found commonly in our mountains at elevations above which any of these trees grow. In fact the Holarctic species *Certhia familiaris* as a whole covers an enormous range which includes the temperate and sub-arctic regions of the entire northern hemisphere. Trees with sequoia-like bark grow over only a relatively small part of this area and there is nothing to indicate that creepers are relatively more abundant in areas of sequoias than elsewhere. Still, the Rankins' and Kennedy's observations prove a decided proclivity of creepers for these trees. The creeper is no doubt a highly successful form with a wide tolerance of ecological conditions, and it may be that sequoia and cedar forests provide about the acme of successful habitat. Naturally many other factors are involved to determine the success, that is, numerical abundance per unit area, of a species in any environment. With other factors being relatively equal, I would expect greater creeper concentration in forests of rough-barked trees than elsewhere. The question might be answered by censuses over areas of similar size in Great Britain where sequoias have and have not been planted. Results of such observations would be highly interesting to me.—James Moffitt, *California Academy of Sciences, San Francisco, September 20, 1940.*

The Fourth Record of the Brown Thrasher in California.—Last March a neighbor told me that she had several times observed a bird at her bird bath which she believed to be an eastern Brown Thrasher (*Toxostoma rufum*). On April 17, 1940, the bird entered my trap, and was given band number 39–253372. It was not observed in the neighborhood after that date.

So far as I can ascertain, there have been but three previous published records of *Toxostoma rufum* in California: one seen by Dr. J. G. Cooper at Clear Lake in September, 1870 (Baird, Brewer and Ridgway, A History of North American Birds, 3, 1874:500), which van Rossem (Condor, 35, 1933:161-162) thinks probably is a valid record; one photographed in Altadena in 1933 by van Rossem (*loc. cit.*); and another banded by Mr. C. V. Duff in Hollywood in January, 1939 (Duff, Condor, 41, 1939:121).—Ethel C. Ayer, *Pomona, California, October 18, 1940.*

Lewis Woodpecker Migration.—While engaged in field work near the town of Mt. Shasta, Siskiyou County, California, on September 10, 1940, the writer noticed a large mass movement of Lewis Woodpeckers (*Asyndesmus lewis*) traveling south in an irregular but continuous stream. The birds had been passing over for an undetermined time prior to 9:25 a.m. when first noticed, and the flight was still in progress when the writer left at 10:45 a.m. No further flight was seen in the area until September 14. Resident birds remained in the area for at least another month.

During the half hour from 9:25 to 9:55 a.m., 1,018 birds, by actual count, crossed over a fixed line, and many others undoubtedly escaped notice because of being too far away to be seen. Although at times only one or two individuals were in sight, on several occasions the numbers crossing the line were so great as to make it difficult to count them all. The speed of flight was typical of their manner on and about foraging grounds, and averaged about the same throughout the period of observation. Well over 5,000 birds must have passed within sight during that time. Some of the birds seemed tired, and took advantage of the proximity of several snags (relics of an old fire) to rest for a short time. Probably no one bird remained perched for more than a minute or two, and there were rarely more than two birds on a snag at any one time.

The line of flight was between Mt. Shasta and Black Butte (Wintoon Butte). At this point an extensive brush field of manzanita (*Arctostaphylos patula*), ceanothus, and other chaparral covers a fairly level area about two miles wide, at an average altitude of about 4,300 feet above sea level. The flight probably extended over the whole two-mile front. The woodpeckers flew at heights of from 10 feet above ground to those at which they were barely discernible.

The flight was quiet and no vocal sound was heard, although many birds passed within earshot. None of the birds was seen to feed, and they seemed indifferent to my movements, even when close by. Smaller flights passed over the same area on September 14 and 17. These later flocks flew by in groups of as many as 78 birds, but there were intervals of a half hour or more during which none was seen. Except for this difference in numbers, the three flights were all alike.—Clarence F. Smith, *Fish and Wildlife Service, Mount Shasta, California, October 10, 1940.*

Notes from San Diego County, California.—*Phaëthon aethereus*. Red-billed Tropic-bird. Dr. Loye Miller's observation of numbers of Red-billed Tropic-birds off the coast of southern California during the summers of 1936-1939 (Condor, 42, 1940:234), establishes this bird as more than an occasional straggler to California waters, in spite of the fact that there are only four previously published records for the State (Condor, 40, 1938:40). However, it may be worth noting that on September 22, 1940, an individual that was unquestionably of this species was observed about five miles west of Point Loma by two persons separately, who reported it to the writer. One was W. H. Miller of the Star and Crescent Boat Company, San Diego, and the other was George Smith of the San Diego County Agricultural Department. Mr. Smith said that the bird seemed "tired," as it made only short flights—apparently a characteristic habit. On the following Sunday, September 29, what was probably the same bird was seen at approximately the same position by Mr. Miller; but a week later he was unable to find it.

Fregata magnificens. Man-o'-war-bird. E. R. Simmermacher, of the State Board of Equalization, a reliable student of birds, reported to the writer that on July 26, 1940, while he was fishing about a mile south of the Scripps Pier at La Jolla, he saw two Man-o'-war-birds on the wing some 400 feet in the air. "They were slender bodied, sharp shouldered, and there appeared to be some white or light coloration visible on the neck from beneath," he wrote. George Smith, who reported the tropic-bird, also observed what he is sure was a Man-o'-war-bird while in his boat about 25 miles off Oceanside on September 9, 1940. W. H. Miller, who takes out fishing parties from San Diego, says that he has seen this species, "off and on, for the past twenty years," usually about August.

Mr. Smith also provided the information that he understood that a Man-o'-war-bird had roosted this summer on the grounds of Mr. and Mrs. Elwood Trask's home, close to Hedionda Slough, Carlsbad, San Diego County. As the result of a letter on the subject, Mrs. Trask called at the office of the writer and gave full details of the incident. She said that the bird first came in at about 5:30 on the evening of July 9, and settled on the tip of a very tall bamboo on her terrace, where it spent the night. It was still there at 4 the next morning, but left at 5, returning, however, at 7:30 and remaining until 8:35, when it was frightened away by the whistle of a passing train. On the following three days the bird returned to its perch each evening between 5:30 and 6:30. On each occasion it was first seen toward the east, sailing very high, then circling lower and lower. It thus always arrived from inland rather than from the ocean, doubtless for the purpose of heading up into the prevailing northwest wind. Mrs. Trask noted that the tail was lowered sharply to arrest the forward movement as the bird was alighting. It seemed to show no fear, and when the bamboo was shaken would take wing, circle for a short distance and return to its perch. On July 13 the visitor was seen about 3 p.m., but it did not come to roost that night and was not seen again.

Mycteria americana. Wood Ibis. Frank F. Gander, of the San Diego Natural History Museum staff, found a flock of 20 to 30 Wood Ibises at Buena Vista Lagoon, Carlsbad, on September 25, 1940. This is a late date for this bird in San Diego County. On October 12, when he next visited the lagoon, they were gone.—CLINTON G. ABBOTT, *San Diego Society of Natural History, San Diego, California, October 17, 1940.*

Summer Records of the Great Gray Owl in Yellowstone National Park.—On July 3, 1940, while driving from West Thumb to Old Faithful, in Yellowstone National Park, Wyoming, I saw a Great Gray Owl (*Scotiaptex nebulosa*) in a small open meadow about seven miles from West Thumb. When first seen, the bird was perched in the top of a small dead lodgepole pine (*Pinus contorta*) but almost immediately flew down into the tall meadow grass where it seized some small prey, apparently a mouse or a shrew. The owl held the prey in its feet and repeatedly bit it with its beak before swallowing it whole. The bird then flew across the meadow to another dead lodgepole pine, and when I followed, flew into the dense forest. The day was dark and cloudy, with intermittent showers, which may account for the fact that the owl was actively hunting at about 10 o'clock in the morning.

Neither Skinner (Roosevelt Wild Life Bulletin, 3, 1925:170-176) nor Bent (Life Histories of North American Birds of Prey, U. S. Nat. Mus. Bull. 170, pt. 2, 1938:219) definitely mention this bird as occurring in Yellowstone National Park in summer. However, there are two summer-taken specimens in the museums of the Park. In a letter dated July 16, 1940, Mr. Edmund B. Rogers, Park Superintendent, writes as follows:

"We have three specimens of this bird in the collection of the Yellowstone museums. Two are in the museum at Mammoth and one is at Fishing Bridge. The first one was collected on August 27, 1931, the second on the following day, and the third one on December 2, 1931.

"The first two specimens were obtained at Grebe Lake by C. H. Taylor and McCafferty. The third specimen was collected by George Mack."

I am indebted to Mr. Rogers for permission to record these specimens.—W. S. Long, *Biology Division, Soil Conservation Service, Salt Lake City, Utah, November 7, 1940.*

Late Nesting of the Band-tailed Pigeon.—George Morrison of McMinnville, Oregon, a predatory animal hunter of the Fish and Wildlife Service, U. S. Department of the Interior, and a keen observer of wildlife, has found several nests of the Band-tailed Pigeon (*Columba fasciata fasciata*) in the coastal counties of northwestern Oregon during the months of May and June, but recently he made an observation worthy of record. During the last days of September, 1940, he flushed an adult Band-tailed Pigeon from its nest 7 feet up in a fir tree beside Agency Creek, 5 miles northwest of Spirit Mountain, in western Yamhill County, Oregon. On September 30, he again flushed the parent bird, and upon examining the nest he found it to contain two eggs. Not only is this the latest nesting date, but it is the only record available of two eggs being laid by the Band-tailed Pigeon in Oregon.—Stanley G. Jewett, *Portland, Oregon, October 1, 1940.*

An Additional Pleistocene Occurrence of the Murre, Uria aalge.—Among some vertebrate fossils recently found in a Pleistocene horizon at Mussel Rock, northwestern San Mateo County, California, is the distal end of a humerus of a murre (U. C. Mus. Paleo. No. 36056). The highly distinctive shape of this part of the alcid skeleton leaves no question concerning the family affinities of the fossil. Except for parts of the surfaces of the condyles, the fossil is well preserved, showing tendinous and ligamentous scars clearly. In every detail it corresponds with the modern *Uria aalge*. The breadth across the shaft just proximal to the ectepicondylar crest is greater than in any of the other larger living alcids such as *Lunda* and *Cerorhinca*, and the crest is less divergent from the shaft at its proximal end. Although we are not able to find differences in configuration of the distal part of the humerus which would separate *U. aalge* and *U. lomvia*, the latter averages larger, at least in the Pacific Basin. The fossil is nearly as small as the smallest humerus in a series of forty skeletons of the modern *Uria aalge californica*. Furthermore, on geographic grounds, it is most unlikely that the northern *U. lomvia* would occur on the coast of California even in the Pleistocene. We may conclude then that the fossil belongs to the species *aalge*.

Uria aalge has been known previously as a fossil only from the Upper San Pedro Pleistocene, near Playa del Rey, Los Angeles County (Howard, Condor, 38, 1936:212).

The fossil was found by the junior author on the east side of a road cut on State Highway No. 1 where the latter skirts the ocean shore at the 200-foot contour due east of Mussel Rock (U. S. G. S. map, San Mateo Quadrangle; U. C. Mus. Paleo. loc. V-4018). The Pleistocene exposed here is of fresh water origin and lies unconformably between the marine Merced Pliocene and late Quaternary red sands, also marine. The Pleistocene beds dip to the northeast, away from the present shore line. Probably they represent an area which was part of a small stream drainage system close to the shore and which subsequently through diastrophism has been elevated and tilted inland. The associated mammalian fossils include bison, horse, sloth and mammoth. Somewhat puzzling is the presence of such a strictly maritime species as the murre in anything but a salt water deposit. It would have been possible, however, for a dead or incapacitated murre on a beach to have been taken a short distance inland along a stream course by some carnivore or scavenger.—Alden H. Miller and Frank E. Peabody, *Museum of Vertebrate Zoology, Berkeley, California, December 3, 1940.*

NOTES AND NEWS

The Fifteenth Annual Meeting of the Cooper Ornithological Club has been scheduled for April 11 and 12, 1941, at Berkeley. This falls on Friday and Saturday of Easter week. Accordingly, it should be easy for those members connected with schools and universities to attend because of vacation periods at that time. The sessions will be held in the Life Sciences Building on the campus of the University of California. The committee in charge of arrangements consists of James Moffitt, chairman, W. I. Follett, Hilda W. Grinnell, Joe T. Marshall, Jr., and Alden H. Miller. Club members who wish to contribute to the scientific program are invited to lay plans now for papers they expect to present. The committee would appreciate knowing of such contributions even in advance of the formal call for papers.

The present issue of the Condor is able to present the history of the California Condor *in extenso*, inclusive of a colored plate, because of the special efforts of Mr. W. Lee Chambers in procuring financial support additional to the income normally available for publishing the magazine.

On December 24, 1940, W. Otto Emerson of Hayward, California, passed away at the age of 85 years. Mr. Emerson was well known to all of the older generation of bird students. His home in Hayward, Palm Cottage, was a center of ornithological activity before and around the turn of the century. Beginning in 1881 he published many of the earliest accounts of the habits of Californian birds, first in the old Ornithologist and Oologist, then in the Nidiologist and finally in the Condor in its early volumes. Attention is called to a portrait of Mr. Emerson taken on his 76th birthday which appeared in the Condor four years ago (39, 1937:46).—A. H. M.

We wish to express gratitude to several people for assisting in editorial work during the past year. Those who have aided are Janet Failla, Hilda W. Grinnell, Joe T. Marshall, Jr., and Virginia D. Miller. The index for volume 42 was prepared by Selma Werner to whom the Club is again indebted for this important service.

MINUTES OF COOPER CLUB MEETINGS

NORTHERN DIVISION

SEPTEMBER.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, September 26, 1940, at 8:00 p.m., in Room 2503 Life Sciences Building, Berkeley, with Mr. Joe T. Marshall, Jr., presiding and 45 members and guests present. Minutes of the Northern Division for August were read. Names proposed for membership were: Mrs. William E. Campbell, Glenbrook, Lake Tahoe, Nevada, by Frances Carter; Andrew C. Olson, Jr., University of Idaho, Moscow, Idaho, by Alden H. Miller.

Fig. 24. Harry Harris, historian, bibliographer and ornithologist; author of "The Annals of *Gymnogyps*" which appear in this issue of the Condor.

Mr. Alden Miller reviewed W. E. Clyde Todd's Birds of Western Pennsylvania, illustrated by George Miksch Sutton, a volume for which data has been collected since 1893. Mr. Haley added reminiscences of boyhood days when he, now a botanist, and Todd, an ornithologist, exchanged correspondence on the subject of butterflies.

W. Otto Emerson urged bird students to secure the cooperation of botanists and entomologists, in order to learn how to make their gardens attractive for certain birds. Mrs. Allen noted the appearance early in August, at Dumbarton Bridge, of the albino Eared Grebe which had been seen there periodically since July 29, 1939.

Mr. Laidlaw O. Williams spoke on "The Display of the Brandt Cormorant," a subject to which he has devoted five years of study, principally in the Monterey region. Lantern slides illustrated the talk, and the excellent colored motion pictures taken by Mr. Andrew Shirra Gibb and explained by Mr. Williams gave a good idea of the painstaking study which Mr. Williams has carried on in the field.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

OCTOBER.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, October 24, 1940, at 8:00 p.m., in Room 2503 Life Sciences Building, Berkeley, with Vice-president E. Lowell Sumner, Jr., in the chair and about 50 members and guests present. Minutes of the Northern Division for September were read and approved. Names proposed for membership were: John Albert Gray, Jr., 4209 Idaho Street, San Diego, California, by Jean M. Linsdale; Frederick Lorenz, College of Agriculture, Davis, California, by John T. Emlen, Jr.

Miss Margaret Lantis, recently returned from a stay of eleven months on Nunivak Island, showed a parka made entirely from the breasts of murres. Cormorant parkas are worn by the women and eider by the men, among the wealthier Eskimos, while murre or puffin garments may be worn by either, among the less well-to-do.

Mr. John T. Emlen, Jr., spoke on "The Social Behavior of the Valley Quail." The Valley Quail is well adapted to field study of social behavior, since it is of sedentary habits and readily observable, and individuals can easily be marked for identification. Quail behavior follows a seasonal cycle, winter flocking being succeeded by pairing in February, although the coveys do not break up until April. After the breeding season, there is gradual merging into the larger units. Ingenious transplantation experiments were carried out to show the relation of individual to covey and covey to territory.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

SOUTHERN DIVISION

SEPTEMBER.—The monthly meeting of the Southern Division of the Cooper Ornithological Club was held at the Los Angeles Museum, Tuesday, September 24, 1940, with Vice-president Hildegarde Howard in the chair and 55 members and guests present.

The minutes of the August meeting of the Southern Division were approved as read. Warren M. Pulich, 2540 College Ave., Berkeley, California, was proposed for membership by W. B. Sampson.

Mr. George Willett reported briefly on the excellent slow motion pictures of bird flight and the many interesting scientific papers presented at the fifty-eighth annual meeting of the American Ornithologists' Union in New England. Of special interest to Cooper Club members was the re-election of George Willett as one of the Vice-presidents of the Union, the election of two fellows from the west coast, Stanley G. Jewett and Robert T. Moore; and the election of John R. Pemberton as a member. A recent amendment to the constitution of the American Ornithologists' Union made it possible for the Cooper and Wilson Ornithological clubs each to elect a member to serve on the A. O. U. Council.

Vice-president Howard introduced the speaker, Dr. Sarah R. Atsatt of the University of California at Los Angeles, who gave a very interesting account of her adventures with birds in Africa. Dr. Atsatt introduced her subject with brief comments on bird types of southeast Africa, illustrated with study skins, and then showed Kodachrome views of bird habitats.

Adjourned.—SHERWIN F. WOOD, *Secretary.*

OCTOBER.—The monthly meeting of the Southern Division of the Cooper Ornithological Club was held at the Los Angeles Museum, Tuesday, October 29, 1940, with Vice-president Hildegarde Howard in the chair and 120 members and guests present.

The minutes of the September meeting of the Southern Division were read and approved. Jim Fairchild, 3960 11th St., Riverside, California, was proposed for membership by John McB. Robertson. The minutes of the August meeting of the Northern Division were read by title and part of the minutes of the September meeting were read pertaining to the legislative amendment endangering state parks.

Vice-president Howard introduced the speaker, Mr. Ed N. Harrison, of Encinitas, California, who showed motion pictures in color of some aquatic birds and their associates in northern California and Oregon. Mr. Harrison was assisted by Mrs. Frances Roberts in photographing some of these birds. At the Tule Lake Refuge in Modoc County, California, excellent photographic studies were made of feeding and nesting habits of the Avocet and of adult and young Canada Geese. In Oregon, on the Upper Klamath River, exceptionally fine studies of the American Egret were obtained including a picture of an American Magpie robbing an egret's nest. At Three Arch Rocks, nesting colonies of California Murres and cormorants were photographed and a fine portrait of the Tufted Puffin was obtained.

Adjourned.—SHERWIN F. WOOD, *Secretary.*

For Sale, Exchange and Want Column.—Each Cooper Club member is entitled to one advertising notice in any issue of The Condor free. Notices of over ten lines will be charged for at the rate of 15 cents per line. For this department, address JOHN MCB. ROBERTSON, Buena Park, California.

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Supplement to Pacific Coast Avifauna No. 10. The author, Anders H. Anderson, has brought this State List up to date. Reprint from The Condor, vol. 36, No. 2, March, 1934, pp. 78-83 - - - - - - - - - - - - $ .30

No. 11, 1915 A Distributional List of the Birds of California; 217 pp., 3 maps - - - - - - - - - $2.00
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Robert Ridgway: 118 pp., 50 ills. with a complete bibliography of his writings (from Condor, 1928) - $1.00

Bird Art Catalogues

Catalogue of an exhibition of paintings by American Bird Artists, First Annual Meeting, Los Angeles Museum, April, 1926; 24 pp. - - - - - - - - - - $1.00

Catalogue of the work of Major Allan Brooks shown in connection with the third annual meeting of the Cooper Ornithological Club, May 4-6, 1928, under the auspices of the San Diego Society of Natural History, Fine Arts Gallery, Balboa Park, San Diego, Calif.; 10 pp. $ .50

Catalogue of an exhibition of bird paintings by Lynn Bogue Hunt, sponsored by the Southern Division of the Cooper Ornithological Club at the Los Angeles Museum, April, 1929; 16 pp., portrait of Lynn Bogue Hunt, and 7 half-tones - - - - - - - - - $ .50

An exhibition of scientific drawings by John Livzey Kidgway, shown by the Los Angeles Museum, on the occasion of the Fifth Annual Meeting of the Cooper Ornithological Club - - - - - - - - - - $ .50

Catalogue of an exhibition of original water colors by Major Allan Brooks, shown under the auspices of the Cooper Ornithological Club, Los Angeles Museum, April, 1936 (Eleventh Annual Meeting of the C. O. C.); 15 pp. and 9 half-tones, including one of Major Brooks - - - - - - - - - - - - - - - $ .50

Other Publications

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By C. BARLOW

Report of the Birds of Santa Barbara Islands, Pub. No. 1, Pasadena Acad. Sci., August, 1897; 26 pp. - $1.00
By J. GRINNELL

Birds of the Pacific Slope of Los Angeles County. Pub. No. 2, Pasadena Acad. Sci., March, 1898; 52 pp. $ .50
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